The American Journal of Surgery

NEW SERIES, VOL. V AUGUST, 1928 No. 2

NON-SURGICAL RENAL TUBERCULOSIS*

ROBERT GUTIERREZ, A.B., M.D.

NEW YORK

THE problem of non-surgical renal tuberculosis is always of great interest, not only in regard to its unlimited scope, but also in regard to its correct diagnosis and proper treatment. Since the frequency of this malady has steadily increased until it has become one of the most common and serious of all pathological infections of the kidney, it will always be necessary to determine the most accurate method of differentiating between the types of infection best treated by medicine or by surgery.

Under the title of non-surgical renal tuberculosis, I shall discuss the most important features of this malady from a triple viewpoint, namely, diagnosis, prognosis, and treatment. The early stages of this infection undoubtedly deserve more careful clinical attention and further urological investigation. The later and more complicated stage, when the disease has become bilateral, is the other phase of interest in which adequate treatment should be established in an effort to improve prognosis.

I shall illustrate this paper with the report of three cases. The first is a case of non-tuberculous kidney in which the presence of Koch's bacillus occurred in the urine obtained by catheterization. The other two illustrate the incidence of bilateral renal tuberculosis.

Considerable confusion arises in the early stage of renal tuberculosis when urinary symptoms appear and particularly when there is not a definite lesion established in the kidney, although there are tubercle bacilli in the urine. Many authors have shown that Koch's bacillus may occur in the urine obtained in a catheterized specimen from the kidney while the kidney on that side has no definite pathological lesion of tuberculosis (Fig. 1).

The discovery of the tubercle bacilli in the urine upon routine examination has great significance in regard to the diagnosis when it corresponds with the clinical and functional renal tests and when the case is studied by modern urological methods, but no laboratory test can be considered of great value if it does not correspond with the clinical condition of the patient. A definite diagnosis should not be made until a positive urographic examination is obtained, combined with the diminished renal functions in regard to urea secretion and phthalein elimination. Moreover, not until the diagnosis can be based upon this triangle of clinical data, namely, kidney functional tests, pyelographic studies and the presence of the tubercle bacilli in the urine, are we certain of a positive diagnosis of tuberculous nephrosis.

It is important to emphasize the well-known principle that in 80 to 90 per cent

* Read before Section of Genito-Urinary Surgery, New York Academy of Medicine, February 15, 1928.
From the Department of Urology (James Buchanan Brady Foundation) of the New York Hospital.

of the cases of renal tuberculosis the infection in the beginning is unilateral. The conception established by Albarran[1] and

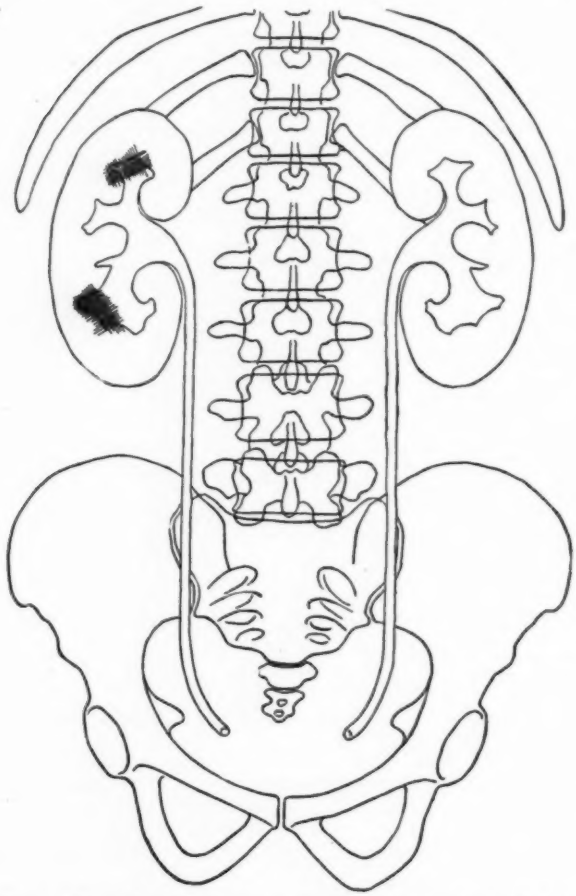


Fig. 1. Drawing of a pyelogram showing toxic nephritis or pyelonephritis in early stage of renal tuberculosis, due to tuberculous bacilluria and lack of drainage without tuberculous lesion in kidney parenchyma, as in case herein reported. The pyelogram shows only shagginess or slight distortion of the upper and lower calices, the kidney function being normal in regard to urea and phthalein elimination. This case shows early stage of non-surgical renal tuberculosis.

Israel[2] that early diagnosis should be followed by nephrectomy for curing or arresting the disease will remain one of the greatest accomplishments of urology.

The etiological study in the last decade, through exhaustive and repeated animal experimentation by many different authors and investigators, has shown that the hematogenous route of invasion is the most usual, and this theory is the one most commonly accepted. But infection through the lymphatics as well as ascending infection from the bladder undoubtedly occur. Infection by direct route and infection by contiguity may come about or a combination of these methods may occur.

Peter[3] and Calmette,[4] followed since by other authors and investigators, have declared that in miliary tuberculosis, when bacillemia exists, the bacilli are excreted in the urine, the kidney serving as a filter. Rafin,[5] for example, stated that the urine of 50 per cent of all cases of pulmonary tuberculosis contained Koch's bacillus. A primary infection of the kidney is considered a rare condition because in the great majority of cases post mortem examination reveals active or arrested lesions localized in other organs, principally in the lungs or the lymphatics. Thus the primary focus has been found very commonly as a latent lesion somewhere else in the body.

Bacilluria in renal tuberculosis may be due to intermittent blood invasion by bacteria, producing showers of germs in the urine without leaving any apparent lesion in the kidney. It may also result from mixed infection and lack of proper drainage. But just as important are the predisposing causes of a later anatomical lesion in the tuberculous process of the kidney. Any of the etiological factors, such as the method of invasion, might explain the cause of tuberculous bacilluria. It must be admitted that the kidneys might be the glands of maximum excretion even of pathological microorganisms without producing any definite histological lesion in the epithelial cells of the tubules or parenchyma of the organs.[6,7]

In the case that I am reporting, the series of histological studies of different sections show regressive changes of the epithelial lining with proliferation and hyaline degeneration of connective tissue. Glomerular lesions as well as definite inflammatory processes, involving here and there the principal elements that form the renal tissue, as can be seen below in the pathological report, give evidence of an acute process of nephritis or tubular

nephritis produced by the toxin or the germs themselves during tuberculous bacilluria. In many instances when bacilluria does occur, it is very likely to leave anatomical or histological lesions, producing what Castaigne[8] has described as toxic or acute nephritis, which may be responsible for the phenomena of essential excretory bacilluria.

The experimental work done on animals by Albarran and Baumgarten[9] as well as by Chauffard,[10] Jousset,[11] and Bernard and Salomon,[12] has proved that injecting cultures of Koch's bacillus intravenously or directly into the renal artery has in many instances produced, by means of the toxin or the bacillus itself, complex lesions in the kidney parenchyma, histologically characteristic of early tuberculous lesions. In some other instances the pathological findings have been those of atypical lesions corresponding with the lesions of an acute tuberculous nephritis, or merely a toxic nephritis.

Considerable work has been done in studying the urine of patients with pulmonary tuberculosis in which no urological symptoms were present in order to discover whether or not, in a routine investigation, these patients have tubercle bacilli in the urine. In the last decade several writers have called attention to the fact that Koch's bacillus may appear in the urine without any lesion in the genitourinary tract. Among the first, Fournier and Beaufume[13] reported the findings of normal kidneys at post mortem in cases of pulmonary tuberculosis in which Koch's bacillus had been found in the urine. Also Brown[14] of Saranac Lake, in studying 156 cases of pulmonary tuberculosis, has found positive results in 13 of such cases. Cunningham[15] of Boston found the presence of Koch's bacillus by means of animal inoculation six times in 66 patients suffering with pulmonary tuberculosis. Schapira, Wittenberg and Spiegelberg[16] of the Sea View Hospital state in a more recent article that in a study of 600 cases they found that in a group of 60 cases the presence of the bacilli in the urine was the only indication of tuberculosis in the urinary tract.

Thus in a thorough and complete urological investigation, this group of cases showed no definite pathological lesion. Therefore, it can be concluded that tubercle bacilli are often found in the urine without subjective symptoms or apparent lesions in the urinary organs.

Morse and Braasch,[17] and very recently Thomas and Kinsella,[18] have come to the conclusion that renal tuberculosis is a part of a generalized disease and that nephrectomy should not be advised until the pyelographic evidence of a gross lesion in one kidney is well established (Fig. 2), together with assurance of good compensating function of the other kidney, allowing the patient at the same time opportunity to build up resistance against tuberculous infection.

Many interesting papers, such as those of Morse and Braasch,[17] Beer[19] and Heitz-Boyer,[20] have been published on the possibility of contamination of the urine and on the different sources from which the bacilli could come. Other writers, as Wegelin and Wildbolz,[21] Legueu, Papin and Verliac,[22] and others have emphasized having found healed lesions or arrested processes in the histopathological study of tuberculous kidney. However, one of the interesting points in regard to the case I am reporting (Case 1) is the fact that because of the pyelographic findings we were treating this case cystoscopically in the routine manner of dilating the ureter and irrigating the kidney pelvis, until the positive report of the guinea pig inoculation arrived which prompted us to remove the organ. Later histopathological study determined it to be a non-tuberculous kidney.

This patient is somewhat improved, gaining in weight, and is under the proper care and attention for her general condition in our postoperative and non-surgical tuberculosis clinic.

The most satisfactory result that one

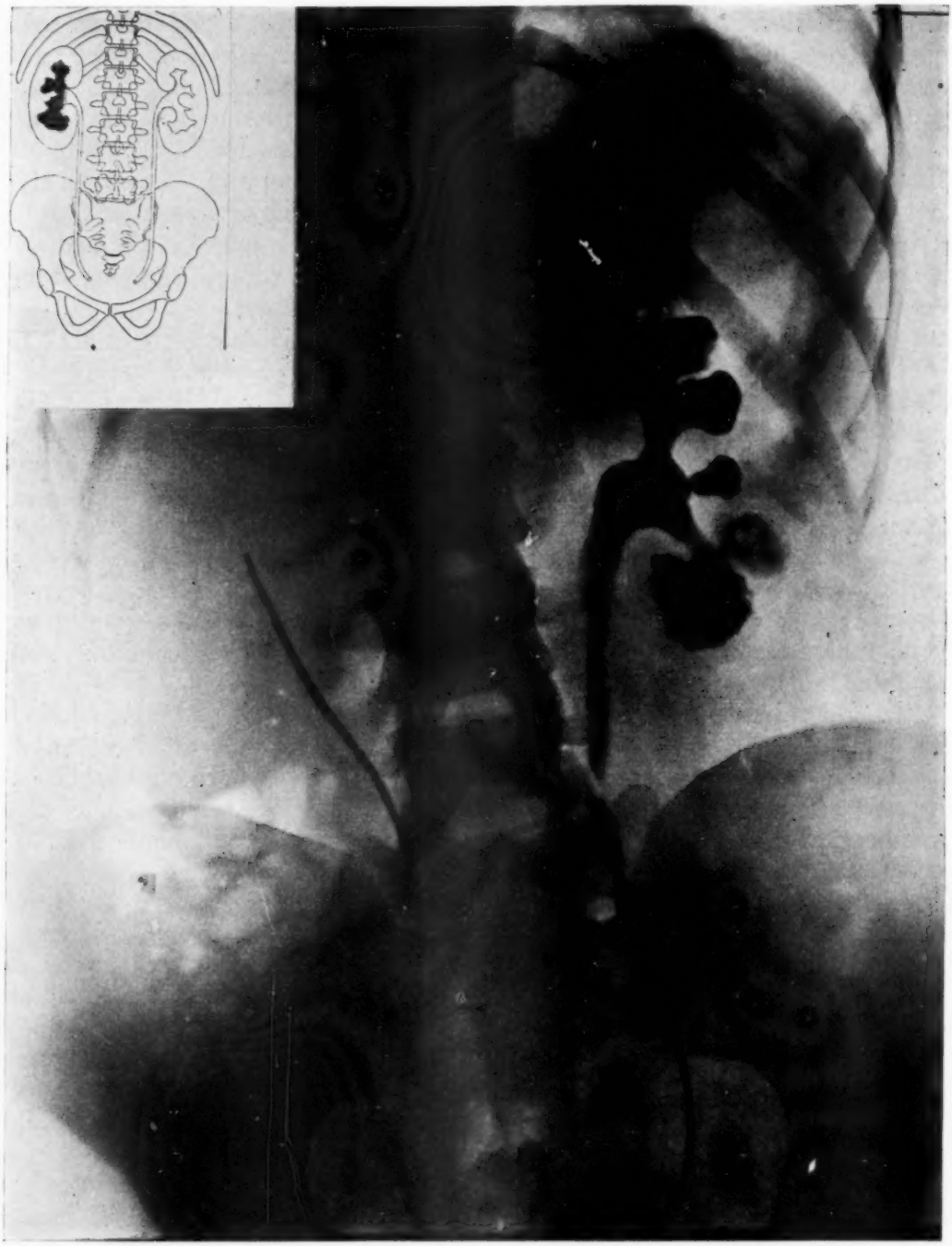


FIG. 2. Case of renal tuberculosis with positive findings, such as diminished renal function, Koch's bacillus in urine, pyelogram shagginess, distortion with dilation and filling defect of calices and pelvis. In this type of case nephrectomy always should be done for permanent cure.

may obtain in the treatment of those cases in our tuberculosis clinic has been reported by Wang and Delzell[23] in a recent article.

Case 1. Renal tuberculous bacilluria in a catheterized ureteral specimen without tuberculous lesion in the kidney.

L. B., female, aged eighteen, was referred to the Urological Clinic of the New York Hospital on July 30, 1925. The patient came accompanied by her mother. She complained particularly of pain in the left lumbar region, frequency of urination day and night, slight burning and dysuria. The family history was irrelevant. There was no history of tuberculosis or any other disease in the family. In early childhood the patient developed scarlet fever and diphtheria and at a later date had the tonsils removed for recurring attacks of tonsillitis. There was no history or sign of any venereal disease. The menstruation started at eleven years of age, this being regular until the last four months when the menstrual period stopped; for this reason her mother brought her to the hospital for an examination.

The present illness was characterized mainly by intermittent pain in the left kidney region for a period of about four months, irradiating along the course of the ureter to the bladder. The pain was a dull aching rather than a sharp knife-like pain, but was persistent and getting worse as time passed. It was associated with a mild frequency and occasionally a slight hematuria, but was noted by the patient only in the form of dark cloudy urine which was thought to be bloody in appearance. During the past half year, she had lost 40 pounds.

On physical examination the patient was seen to be a young woman somewhat anemic, pale and slightly emaciated but apparently not acutely ill. Her blood pressure was normal and the Wassermann test negative. The abdomen, chest and heart were apparently normal except that the left kidney was slightly enlarged and palpable. The urine analysis showed acid reaction and a specific gravity of 1022; the appearance was cloudy with the presence of a faint trace of albumin and microscopic pus and blood cells. The patient was subjected to a complete urological investigation in order to arrive at a definite diagnosis.

On August 2, 1926, the patient was cystoscoped for the first time and a bladder mucosa normal throughout was found. Ureteral orifices were normal in location, shape and appearance, the vesical orifice also being normal. Both ureters were catheterized without difficulty with a No. 6 French catheter. Specimens were collected from each kidney and from the bladder and sent to the laboratory for culture and microscopical examination; specimens were also collected from each kidney for urea estimation and for a guinea pig inoculation. One c.c. of phenolsulphonphthalein injected intravenously appeared on the right side in seven minutes and on the left side in ten minutes. The total amount was collected for a period of ten minutes for functional estimation, which was 8 per cent for the right and 6 per cent for the left kidney.

LABORATORY REPORT OF URETERAL SPECIMENS

	Right	Left
Character	Bloody*	Bloody*
Urea	9⅘ gm. per L.	11 gm. per L.
PHENOLSULPHONPHTHALEIN		
Appeared	7 mins.	10 mins.
Per cent	8	6
Time	10 mins.	10 mins.
MICROSCOPIC EXAMINATION OF SEDIMENT		
Wet specimen	Much blood Occ. epithelial cells Some debris	Much blood Much debris

Cultures of urine show right and left ureters and bladder sterile.

* Apparently due to a traumatism caused by the catheter.

One week later, on August 9, 1926, the patient was cystoscoped again. The bladder mucosa was found normal throughout. Catheters were passed to both kidney pelves and after collecting specimens for culture and microscopic examinations, plain roentgen-ray pictures with instrument and catheters in position were taken, and also pyelograms and ureterograms in the usual manner, about 15 c.c. of a solution of sodium iodide, 20 per cent, being injected.

The report of this urographic examination showed kidneys normal in size and position and no shadows indicative of stone anywhere in the urinary tract. The left pyelogram showed a definite shagginess in both upper and lower calices, and a stricture or a narrowing at the ureteropelvic junction.

The impression that one gathered in this case was that of infection of the left kidney, which had some of the appearance of tuberculosis, and a contraction or a stricture of the upper portion of the ureter at the ureteropelvic junction.

The importance of this case is that while we were waiting for the report of the guinea pig inoculation, we were treating the patient in the routine weekly manner by dilating her ureters through the cystoscope and irrigating each kidney pelvis with a solution (1 to 1000) of acriflavine.

This patient undoubtedly was improving under this treatment, as she stated that her kidney pain and urinary symptoms were greatly diminished, but after six weeks of treatment, we were notified by the laboratory of the presence of Koch's bacillus and the positive guinea pig inoculation from the left kidney. Without any further investigation the patient was advised to enter the hospital for an operation to remove her left kidney for tuberculous infection of that organ.

Nephrectomy of the left kidney was carried out through the ordinary lumbar incision, exposing the organ, tying the ureter and then the pedicle and closing the wound in the usual manner. The patient had an uneventful recovery and went home on the fourteenth day after her operation.

To our surprise the kidney during operation was apparently normal. Later the pathological report of the microscopical study of the specimen showed only the features of a chronic pyelonephritis with no evidence of tuberculous lesion. The examination made of further sections showed a moderate amount of regressive change in the epithelial lining of the tubular parenchyma. The tubular lumina contained a granular pinkish material in some parts. Here and there a glomerulus was found replaced by hyaline connective tissue and surrounded by a mononuclear round cell infiltration of the stroma. Bowman's capsule appeared distended in some instances and a pink homogenous substance was seen in the periglomerular space, suggesting the presence of albumen.

The appearance was that of a normal kidney measuring 9 by 6 by 5 cm. The capsule showed no focal lesions and could be stripped easily, leaving a smooth surface. The pelvic mucosa appeared wrinkled, grayish-white in color. The definite statements of our pathologist, after a careful study, was that no evidence of tuberculous lesion was found in the sections examined from this specimen. It is evident that in this case the predisposing factors observed in early life were largely present and that a definite toxemia also was present, acting favorably to protect the tuberculous bacilluria, which was responsible for the urinary symptoms and the inflammation and infection sufficient to produce the pathological lesions in the kidney that were characteristic of the condition of acute toxic nephritis.

RÉSUMÉ

The case showed evidence of toxic nephritis with pyelonephritis, due undoubtedly to the bacillemia from tuberculous bacilli that were found in catheterized specimens taken from the left kidney. I think we may say that a distinct lack of proper drainage, due to a slight obstruction at the ureteropelvic junction, clearly shown in the pyelogram, and the presence of a focus of infection somewhere else in the body, were the combined causes of the secondary infection of the kidney. It is assumed that the parenchyma of this organ did not show any tuberculous lesion.

We feel that in a case of this sort, without treatment, sooner or later infection will set in, getting worse in many instances so that an occluded kidney is bound to result.

BILATERAL RENAL TUBERCULOSIS

The frequency of renal tuberculosis is greater than is ordinarily suspected, but the involvement of both kidneys is not so commonly seen. Although there is not much difference in regard to symptoms and clinical aspect in the early stages of the disease, it is more characteristic in bilateral kidney disease to find involvement of some other viscus in the body. This has been well illustrated by Young and Davis[24] in the study of 32 cases of bilateral renal tuberculosis. Young found that whenever both kidneys are affected, it is always possible to find pathological lesions involving one or various of the other genitourinary organs, and that in addition to the advanced stage of pulmonary tuberculosis that may exist, the urinary bladder is invariably involved, if not by definite pathological lesions at least by symptomatic disturbances, as a complication arising from the general tuberculous processes.

Not many cases of bilateral renal tuberculosis (Figs. 3 and 4) have ever been published in the literature but more recently a few authors (Rousseau,[25] Keyes,[26] Marion,[27] Braasch and Scholl[28]) have called attention to the importance of this, so-considered, hopeless clinical problem in an effort to establish correct therapeutic procedure.

Legueu[29] quoted from the literature 87 cases of bilateral renal tuberculosis and added six personal observations, studying a total of 93 cases. His conclusions were most encouraging. After the poorest functioning kidney has been removed the bladder symptoms often disappear and the tuberculous lesion of the remaining kidney has been arrested or cured, relieving the active pathological condition and prolonging life. Legueu quoted the work of Israel, stating that the tuberculous process of the second kidney occurred in the proportion of 29.2 per cent in the cases in which no operation for the early malady was performed, and that in 1022 cases of nephrectomy the second kidney was later involved only in 13 patients, in the proportion of only 1.6 per cent. The thesis of Barrie[30] is also of value in showing interesting figures in regard to this problem. Proportionately, bilateral renal tuberculosis is not so commonly seen clinically, since the figures reach only 14.6 per cent, but it is surprisingly increased in postmortem findings, the figures reaching 47.9 per cent of the cases. The results of these investigations mean, therefore, that unilateral kidney disease varies from 85.9 per cent to 52.1 per cent, showing consequently that with the better media of diagnosis and more accurate investigations that we have at our disposal today, we can prevent by early nephrectomy the invasion of the other kidney, arresting the disease or curing it even in the early cases of bilateral infection.

In some instances, albuminuria, hematuria or other urinary symptoms are due to the toxic infection produced by the bacillus in the non-affected kidney, or independent of the tuberculous process which is only an inflammation of the tubules or a glomerulitis, as in the parenchymatous

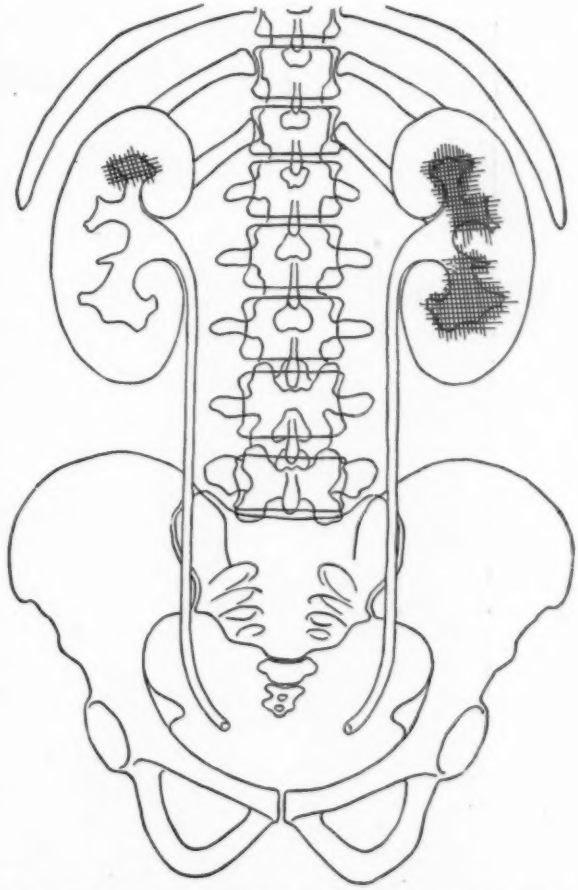


Fig. 3. In cases of bilateral renal tuberculosis, with good function in one kidney and very much diminished function on opposite side as indicated with the aid of the pyelogram, removal of more seriously affected kidney is recommended, as illustrated in case herein reported.

nephritis which has been brought to light by Albarran[31] and other writers.

Rovsing,[32] among other investigators* has emphasized the value of kidney function for a differential diagnosis in early renal tuberculosis, particularly by systematically undertaking quantitative and partial analysis of urea. The normal secretion of urea is a safe criterion of a sufficient amount of kidney tissue capable of functioning. At the same time, of course, one must have in mind the hyper-compensating function as well as the reduced secretion,

* 33, 34, 35.

inasmuch as the latter directly or indirectly can be due to the diseased kidney; directly by a purely reflex effect, as the reno-renal reflex, and indirectly by the disease influencing the functions of the whole organism. However, urea estimation in routine examination is of decided value and perhaps is as important in regard to the kidney work and functional activity as any other test, even as the simplest microscopic and chemical urine examination. Geraghty,[36] and also workers at the Mayo Clinic, give more credit to phthalein alone, though we advocate the combined methods of phthalein and urea secretion in both unilateral and bilateral disease. The universal routine cystoscopic examination with the catheterization of both ureters, the combined color dye test and urea elimination and pyelography is undoubt-

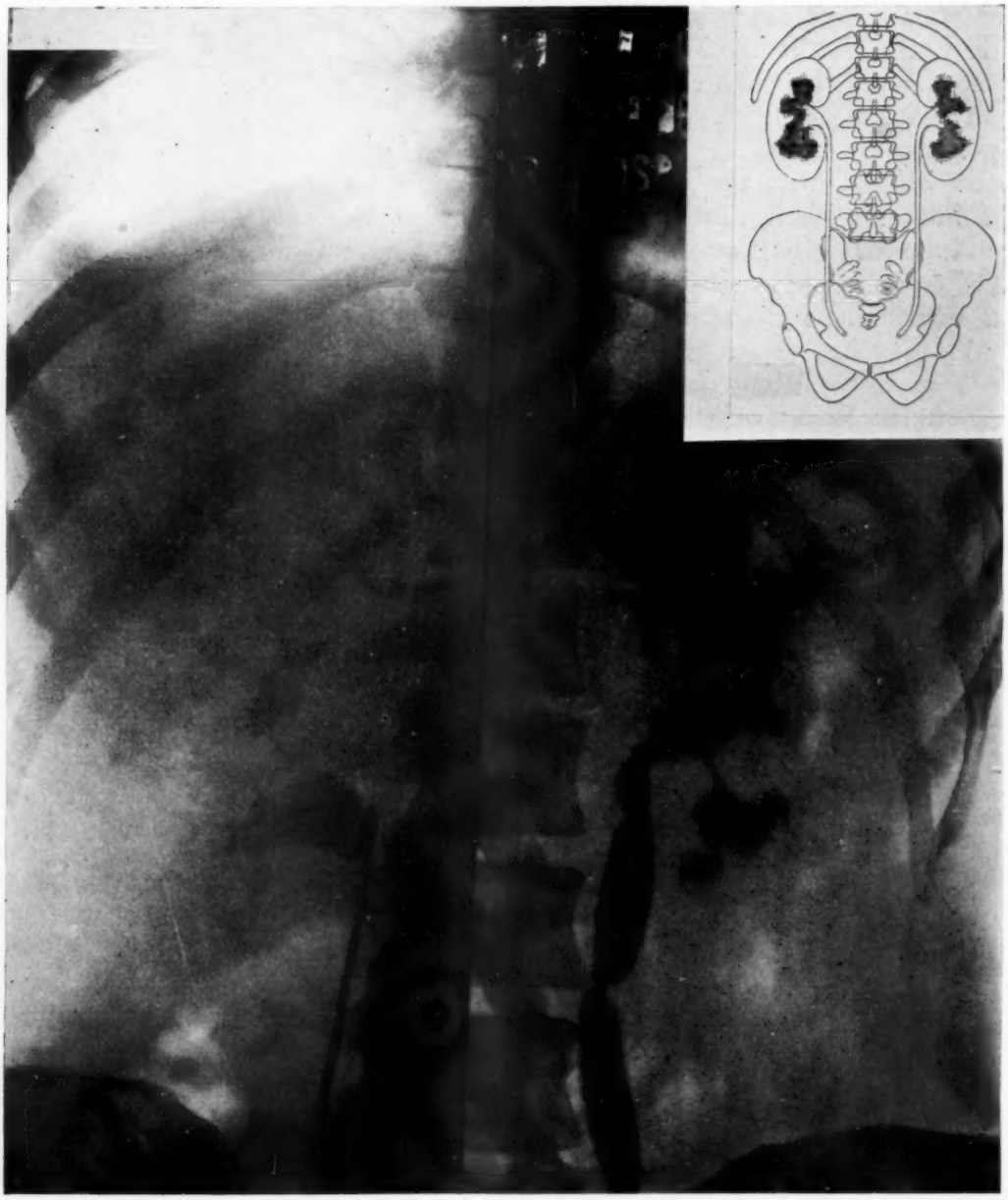


FIG. 4. Cases of non-surgical bilateral renal tuberculosis, in which instances the functional tests are equally poor in both kidneys, which is largely evidenced by the pyelogram, should receive medical treatment and sanitarium care for most beneficial results. This type is illustrated in Case III.

edly the most accurate, skillful and perfect method of diagnosis, accompanied always by the guinea pig inoculation in an effort to detect Koch's bacillus. In some instances of bilateral disease, Achard's methylene blue or Voelker's indigo carmine test also is valuable in addition to the phenol-sulphonphthalein test so often used.

To arrive at a sound diagnosis and prognosis, we should always base our investigations on the triangle of principles above mentioned, clinical data, kidney functional tests and pyelographic studies. In doubtful cases it is obvious that the entire investigation should be repeated in order to arrive at a more conclusive diagnosis, particularly in bilateral disease. There is a definite value in routine blood chemistry examination,* including estimation of urea, creatin, creatinine and CO_2 concentration power, which it is not necessary to emphasize in this paper. However, in urinary surgery the combined method of blood chemistry and renal tests are invaluable. It was accepted as a uniform criterion by many authorities during the discussion held at the 1927 meeting of the International Congress of Urology.[41]

Progress in conservative treatment in renal tuberculosis has been marked in the last two decades.[42,43]

Conservative surgery[44,45] should be considered particularly in anomalies of the kidneys and when only half of the organ is involved, for it can be controlled by the pyelograms and functional tests, as has been satisfactorily proved by different surgeons.[46,47] For example, a few cases have been reported of heminephrectomy in tuberculous horseshoe kidney in which the other half of the organ was normal, not only clinically and pathologically but in regard to bacteriological examinations, functional tests and pyelogram examinations. This refined and advantageous method, which perfects diagnosis and makes conservative kidney surgery possible, is undoubtedly due to the era of the cystoscope and a developed urography, for which we owe much to the genius of Albarran.

Furthermore, conservative cure by hemi-

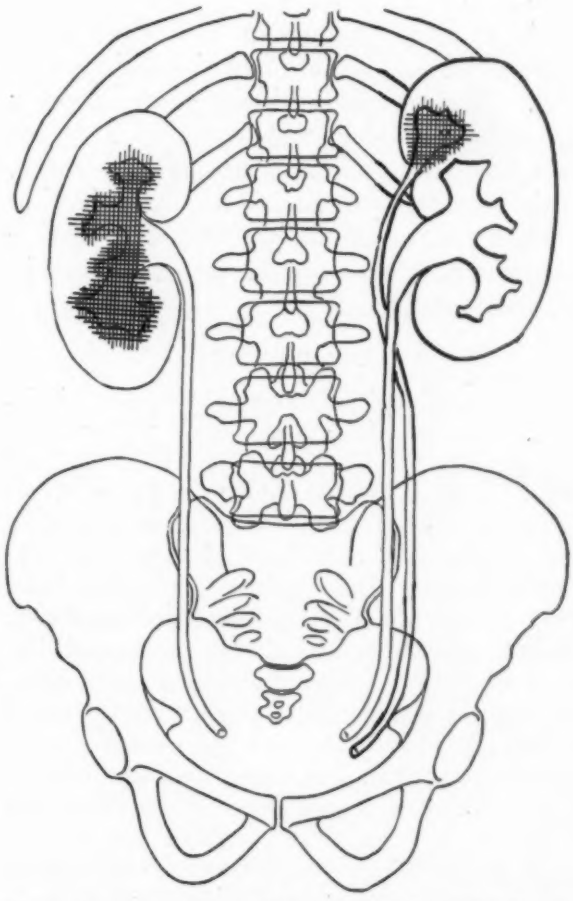


Fig. 5. In types of anomalies of bilateral renal tuberculosis, conservative surgery is indicated in some instances.

With the aid of the pyelogram and functional tests, the case above illustrates an instance in which heminephrectomy in the upper pole of a double tuberculous kidney can be accomplished, and in a second operation nephrectomy of the opposite functionless tuberculous kidney can be done with benefit to the patient, assuring the maintenance of life with one-half of a kidney. This type is seen in cases reported by Legueu, Papin and Marion.

nephrectomy in a few cases of double kidney and double ureter involvement has been obtained,[48,49] as well as in our cases of bilateral renal tuberculosis upon which partial nephrectomy was performed (Fig. 5). Half of the double kidney on one side was removed and later, in a second operation, nephrectomy of the other tuberculous kidney was performed, both operations being successfully carried out, assuring

* 37, 38, 39, 40.

relief from symptoms and prolongation of the patient's life.

Bilateral renal tuberculosis can be arrested or perhaps cured in these days of modern diagnosis when the disease is discovered in its earliest inception and when the second kidney has enough parenchyma and enough function to maintain life. In a careful study of such cases, early nephrectomy should be the indication of choice, understanding that postoperative care and proper medical treatment result in greatest benefit.

CASE REPORTS

Case II. Surgical bilateral renal tuberculosis.

C. H., an Irishman, aged thirty, was admitted to the Urological Service of the New York Hospital, October 9, 1924, with complaint of extreme urgency and frequency of urination, hematuria and very marked nycturia. The family history was negative for tuberculosis. He had had the ordinary diseases of childhood. General condition had always been good. His present illness commenced in June, 1924, when nycturia, frequency and urgency were noticed which steadily increased in severity. Two months later the first hematuria was noticed and since then it has been intermittent and alarming as time went on. The patient lost over 30 lbs. On physical examination patient appeared a well developed man 5 ft., 10 in. in height, and weighed 168 lbs. which was reduced, at the time of admission, to 142 lbs. On general examination the head, eyes, nose, mouth, neck, thorax, and heart were normal. The abdomen was soft, no masses or tender areas were made out. There was present on pressure a slight pain over left kidney, and the kidney was easily palpable. External genitalia, extremities and reflexes were also normal. The Wassermann test was negative. Blood pressure 130 systolic, 72 diastolic. The urine analysis showed much pus and acid reaction; specific gravity, 1017.

The cystoscopic and pyelographic examinations revealed tuberculosis of the kidney; function on the left side was much diminished compared with the right and the guinea pig inoculation showed a positive finding for renal tuberculosis. Left nephrectomy was performed, October 14, 1924, under paravertebral anesthesia, which we have been using in these cases very satisfactorily.

The pathological report of the specimen removed showed tuberculous kidney with superimposed pyogenic infection.

The patient was discharged from the hospital, November 3, 1924, with his kidney wound healed but still complaining of considerable frequency and painful urination for which we advised continuation of treatment in our tuberculosis clinic.

RÉSUMÉ

When the patient came to the hospital in October, 1924, with severe urinary symptoms, in bad general condition and suffering with bilateral renal tuberculosis, he was submitted to left nephrectomy followed by intensive hygienic and heliotherapeutic general antituberculous treatment weekly in our tuberculosis clinic. On October 26, 1927, or three years after his operation, the patient was still alive and his general condition very much improved. His weight increased from 142 to 155 lbs. His temperature was 98, pulse 96. He was feeling very well, had no frequency of urination either day or night; he had only occasional slight burning at urination. He is still under the proper care and treatment in our clinic for his tuberculous condition. He has had a most happy convalescence and the result after this long treatment is apparently that of permanent cure.

Case III. Non-surgical bilateral renal tuberculosis.

C. P., an Italian, aged twenty-four, married, was referred to the Urological Service of the New York Hospital, January 25, 1926, complaining of urinary symptoms which began in October, 1925, with dull aching pain across her back and slight frequency of urination. In January, 1926, the pain radiated to the left side of the back over the kidney region. She had burning on urination, and frequency every thirty minutes. She had nycturia and had attacks of hematuria. She had slight loss of strength, weighing upon admission 102½ lbs. Family history was negative and the past personal history was irrelevant. General physical examination was negative except that there was an old inactive tuberculous lesion in the right lung localized in the posterior upper right apex.

The patient was submitted to a complete urological examination. Cystoscopy showed edema and congestion of both ureteral orifices.

No definite ulcers were seen. Both ureters were catheterized without difficulty. Specimens were collected from each kidney for urea, microscopic and bacteriological examination and for guinea pig inoculation. One c.c. of phenolsulphonphthalein was injected intravenously and appeared in five minutes on the left and in nine minutes on the right, and was collected for ten minutes for estimation. Roentgen-ray films and pyelograms were taken in the usual manner.

REPORT OF URETERAL SPECIMENS

	Right	Left
Character	Clear	Clear
Urea	6 gm. per L.	1 gm. per L.
PHENOLSULPHONPHTHALEIN		
Appeared	9 mins.	5 mins.
Per cent	trace	5
MICROSCOPIC		
Wet specimen	Occ. blood Occ. epi.	Occ. blood Occ. epi.

The urographic report showed considerable distortion with marked dilatation and shagginess of both calices and pelvis of left kidney, giving the impression of tuberculosis.

One week later cystoscopy was repeated with functional tests and pyelogram of right side was taken. It showed a great distortion and raggedness of the upper, lower and middle calices and marked distortion of the kidney pelvis, on account of which the suggestion of tuberculosis of the right kidney was made. The kidney function was much diminished on both sides in regard to urea and phthalein elimination. Also Koch's bacillus was detected and the guinea pig inoculation with the specimens collected from each kidney was positive for tuberculosis. Therefore, the diagnosis of bilateral renal tuberculosis with equally diminished function on both sides was made.

The patient has been receiving treatment and special medical attention in our tuberculosis clinic as an inoperable case of bilateral renal tuberculosis. This patient has improved somewhat in her general condition and particularly as regards her tuberculous urological pathology. She is feeling better but still complains of frequency of urination. Her weight has increased from 102½ to 126 lbs. Indeed at present no surgical treatment for the type of this group of advanced cases should be applied. However, one should be prepared for what may occur, because in some instances when marked pyuria, pain, fever and general symptoms develop, an occluded or functionless kidney may result and therefore surgical relief should be considered, i.e., a palliative procedure, as a nephrotomy, in an attempt to secure drainage and finally possibly a better prognosis.

SUMMARY

We wish especially to call the attention of practitioners and urologists to the extreme and progressive frequency of this malady, both unilateral and bilateral, and to the fact that there are certain instances of this disease in which surgery as a therapeutic procedure should not be applied. We would emphasize the fact that combined medical and urological treatment in a select group of cases yields the most profitable and satisfactory results.

In the three cases reported, the first one shows the incidence of an excretory renal tuberculous bacilluria without demonstrable pathological lesion in the kidney. The clinical value of this fact speaks for itself in the misleading interpretation of many diagnoses.

The second case illustrates early bilateral renal tuberculosis when surgery must be applied as the best and most reasonable treatment arresting or curing the disease.

The third case reported illustrates the advanced stage of bilateral renal tuberculosis, when both sides are equally involved with greatly diminished function, and when surgical treatment should not be recommended.

There is no definite rule governing the solution of the clinical problem, but no kidney should be removed, particularly in doubtful cases, until after the three elements of the triangle, pointed out in this paper, are present to a marked degree and associated also with positive microscopic findings or guinea pig inoculation.

Repeated urological investigations in many instances are entirely justified in an effort to discover the earliest tuberculous

lesion of the upper urinary tract, and also to prevent the involvement of the second kidney. However, it is of great value to

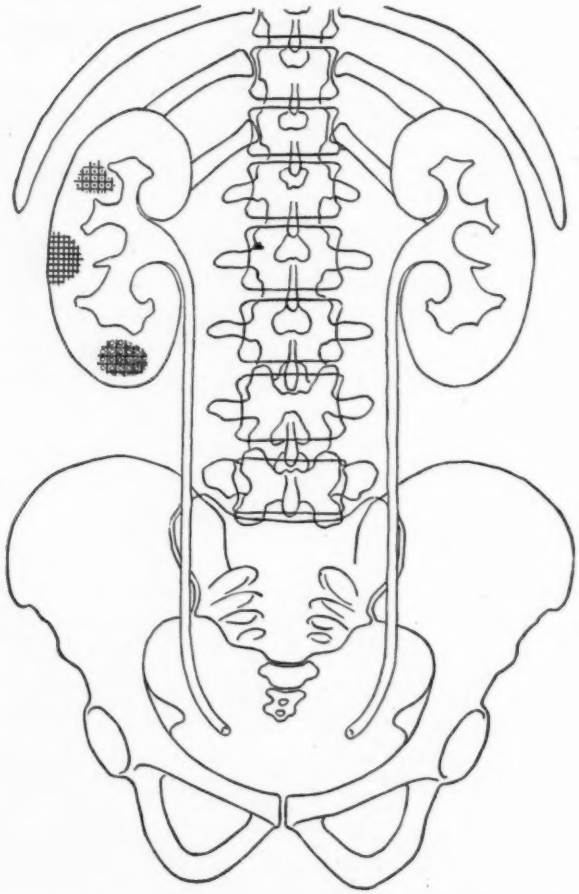


Fig. 6. This drawing shows the three stages of early renal tuberculosis most difficult of diagnosis; miliary, nodular, and abscess or cavernous types. In these three conditions the initial lesion is localized in the parenchyma without communicating with calices or pelvis. Slight urinary symptoms are present, but the triangular factors of diagnosis in many instances may be absent. The treatment should be preoperative, medical and urological, as illustrated in Case 1.

recall that genitourinary tuberculosis is a syndrome of a general body process localized in one or more of the genitourinary organs, demanding immediate attention in regard to hygienic and antituberculous treatment, i.e., the use of tuberculin, sunlight, forced diet, rest, plenty of fresh air and a peaceful life.

In the light of modern urology, two distinct types of renal tuberculosis must be differentiated, the one that requires only medical treatment and the one requiring surgical treatment, when nephrectomy as a rule is indicated. But there are still certain cases in the early stage of the disease when the process is localized, involving only isolated zones of the cortical parenchyma or the medullary substance and when the lesion is walled off and does not communicate with the papillae, the calices or the pelvis, and therefore is a closed or isolated process, as we can readily see in the three distinct types shown in Figure 6. In these cases the diagnosis is most difficult, and nephrectomy should not be performed until the process is well established, i.e., after the tuberculous nodules or abscesses have broken through into the excretory apparatus producing pyuria and other marked urinary symptoms. We should not forget that not until that stage is reached can pyelographic data reveal the condition. These cases evidently require most active and efficient medical and urological treatment in order to attain a cure. But if the disease can not be arrested or cured, and the symptoms progress, the permanent cure may be obtained in from 80 to 90 per cent of the cases by early nephrectomy.

On the other hand we should not wait for the incidence of an occluded renal tuberculosis, as occurs in autonephrectomy for blocking of the ureter, nor should we depend upon body resistance that the disease may continue for a long period of time. Logically it is assumed that the focus of infection is bound to develop further infection in the other kidney or in the lower urinary tract at a most serious risk. The damage that nature may cause insidiously in destroying the whole kidney parenchyma, by the tuberculous process alone, is undoubtedly worse than the traumatism of a simple nephrectomy in order to remove an organ deeply involved and functionless (Fig. 7).

However, medical and urological routine treatment, as administered by the newly formed Tuberculosis Division of the Brady Urological Foundation at the New York

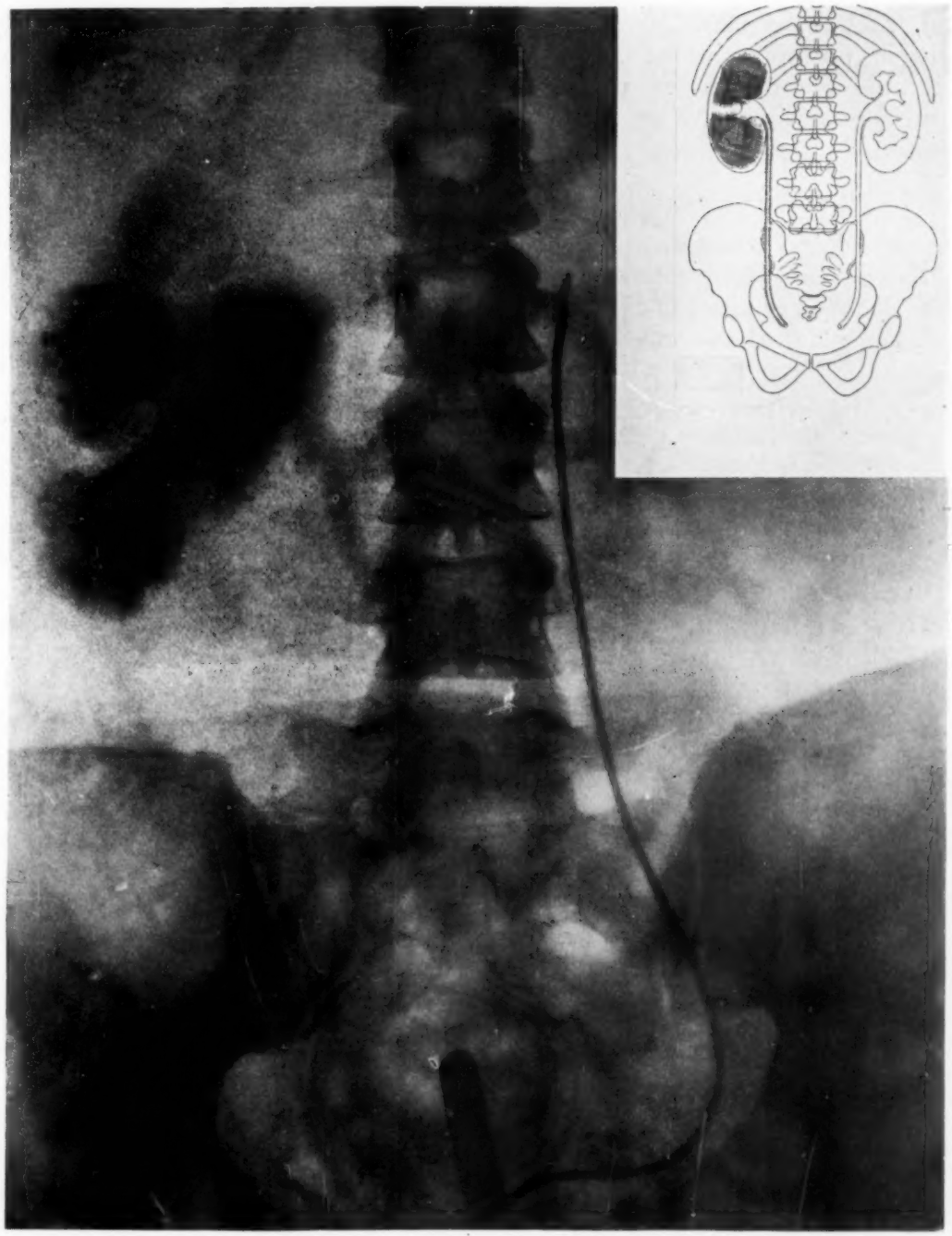


Fig. 7. Case of occluded renal tuberculosis showing pyohydronephrosis or "pyronephrosis" in which the diseased kidney was functionless, as is well evidenced in the pyeloureterogram. The organ removed at operation showed complete distortion of whole kidney parenchyma. In those cases having good function of opposite kidney, nephrectomy is indicated.

Hospital, should be used systematically not only in postoperative or inoperable cases, but more especially in the earlier stages of the disease, for it is at this period that results are most gratifying.

CONCLUSIONS

From the clinical study as well as from the observation of a long series of pyelograms in all types of cases of renal tuberculosis, we may draw the following conclusions:

1. In renal tuberculosis we are dealing in the great majority of cases with a hematogenous infection that has been localized in the kidney.

2. Tuberculous bacilluria may indicate the latency of a localized focus of tuberculosis somewhere else in the body.

3. Tuberculous bacilluria does not always mean renal tuberculosis. Therefore, routine and repeated urological examinations, particularly in early stages, should always be made.

4. Nephrectomy should be advised only when the clinical data are in accordance with a positive pyelogram and the report of the laboratory and when the kidney function is diminished in regard to urea secretion and phenolsulphonphthalein elimination, providing also that the other kidney has function to maintain life.

5. Renal tuberculosis is accepted as a unilateral disease, but the incidence of bilateral renal tuberculosis is more common than has ever been suspected clinically.

6. In bilateral renal tuberculosis when the general condition of the patient is favorable and there is good kidney function on one side and a diminished function on the opposite side, the more seriously effected kidney should be removed, providing that the remaining organ has enough good parenchyma and sufficient function to maintain life.

7. Conservative surgery is indicated in renal tuberculosis, particularly in anomalous cases when they can be controlled by pyelographic studies. Heminephrectomy and partial nephrectomy in some instances should be recommended.

8. The azotemie index, or the study of blood chemistry in regard to CO_2 concentration power, urea, creatin and creatitine, should always be made in order to determine the degree of nephrosis and in an effort to determine a better prognosis.

9. When the pyelogram shows pyelonephritis, slight degree of hydronephrosis, narrowing or stricture at the ureteropelvic junction or kinks in the ureter sufficient to interfere with good drainage, and when there is fairly good kidney function without any apparent lesion of the bladder mucosa, these cases should be treated cystoscopically by the routine methods of catheterization and dilation of the ureters and irrigations of the kidney pelvis with an antiseptic solution, such as acriflavine, 1 to 1000. This treatment should be given weekly. The patient at the same time should be placed in the best hygienic surroundings and appropriate medical treatment instituted in order to allow him to build up resistance against infection.

10. Early tuberculous lesions in the kidney, which in many instances start in the papillae or in the calices for lack of proper drainage, may be cured, healed or arrested when the above method of treatment is used.

11. Histological signs of cure, such as healing lesions and inactive localized processes in the kidney parenchyma, often found, are similar to those commonly observed in lung tissues, and therefore emphasize the fact that cure is possible under intensive medical and urological treatment.

12. When a gross lesion is visualized by a positive pyelogram coincident with the absence or diminution of renal function, the treatment should always be nephrectomy, providing that such patients go afterwards for a long period of time to a sanitorium or continue to receive medical attention with the usual treatment for tuberculosis.

BIBLIOGRAPHY

1. Albarran, J. Tuberculose rénale. *Presse méd.*, No. 80, pp. 617–639, 1905.
2. Israel. *Correspondenz-Blatt f. Schweitzer Aerzte*, 41: 1265, 1912.
3. Peter, M. Leçons de Clinique Médicale. Paris, 1879. 2: 160–580.
4. Calmette, A. L'Infection Bacillaire et la Tuberculose chez l'Homme et chez les Animaux. Paris, Masson et Cie, 1928.
5. Rafin. Tuberculose Rénale. Encyclopédie Francaise d'Urologie. 2: 677–831, 1914.
6. Albarran, J. Étude sur le Rein des Urinaries. Paris, 1889.
7. Kidd, F. Common Infections of the Kidneys. N. Y., Oxford Univ. Press, 1920.
8. Castaigne, J. Maladies des Reins. Paris, 1906. Pp. 518–544.
9. Albarran and Baumgarten. Quoted by Molla in Manual de Urologia, Madrid, 1922. 2: 241–303.
10. Chauffard, A. Néphrite par tuberculine. *Bul. méd.*, 6: 1385, 1892.
11. Jousset. Rein et bacilles de Koch. *Arcb. d. med. exper.*, 1904.
12. Bernard, L. and Salomon, M. Lesiones des reins consecutives a l'infection arterelle et veineux de bacilles tuberculeuses. *Presse méd.*, 1904.
13. Fournier and Beaufume. Quoted by Archard and Paisseau in Encylopédie Francaise d'Urologie, 2: 885–910, 1914.
14. Brown, L. The significance of tubercule bacilli in the urine. *J. A. M. A.*, 64: 886–890, 1915.
15. Cunningham, J. H. Facts regarding the relation of tuberculosis of the kidney to tuberculosis of the lungs. *Boston M. & S. J.*, 15: 872, 1911.
16. Schapira, S. W., Wittenberg, J. and Spiegelberg, S. L. The urinary tract in pulmonary tuberculosis. *J. A. M. A.*, 70: 591, 1918.
17. Morse, H. D. and Braasch, W. F. Comparative value of guinea pig inoculations in diagnosis of renal tuberculosis. *J. Urol.*, 17: 287, 1927.
18. Thomas and Kinsella. Some data concerning the clinical course of renal tuberculosis. *J. Urol.*, Feb. 1928.
19. Beer, E. The significance of ureteral tubercle bacilluria. *Am. J. M. Sc.*, 154: 251, 1917.
20. Heitz-Boyer. À propos de la pathogenie de la tuberculose rénale. L'Association Francaise d'Urologie, 14: 409, 1910.
21. Wegelin and Wildbolz. Anatomische Untersuchungen von Frühstadien der chronischen Nierentuberkulosie. *Ztscbr. f. urol. Cbir.*, 2: 201, 1914.
22. Legueu, Papin and Verliac. Étude anatomique de la tuberculose rénale (origine, evolution, processus de guerison). *Arcb. urol. d. l. Clin. d. Necker*, 1: 436, 1913–14.
    Young, E. L. Spontaneous healing of renal tuberculosis without total destruction of kidney. *Am. Urol. Assn.*, 10: 213, 1916.
    Delbet, P. Des conditions de curabilité de la tuberculose rénal. IXe Session de l'Association Francaise d'Urologie. Paris, 1906.
23. Wang, S. I. and Delzell. The treatment of inoperable and postoperative tuberculosis of the urinary tract. *J. A. M. A.*, 88: 1872, 1927.
24. Young, H. H. and Davis, D. M. Practice of Urology. Phila., Saunders, 1926. 1: 302, Table 33.
25. Rousseau. Les Interventions dans la Tuberculose Rénal Bilaterale. Paris, 1914.
26. Keyes, E. L. Urology. N. Y., Appleton, 1921. P. 431.
27. Marion. Traite d'Urologie. Paris, Masson et Cie, 1921. 1: 280.
28. Braasch, W. F. and Scholl, A. J. Possible errors in the diagnosis of renal tuberculosis. *J. A. M. A.*, 82: 688, 1924.
29. Legueu. De la nephrectomie dans les tuberculoses bilaterales. *Arcb. urol. d. l. Clin. d. Necker*, 1: 141, 1917.
30. Barrie. Valeur de la nephrectomie pour tuberculose unilateral. Thèse de Lyon, 1912.
31. Albarran, J. Lesiones du rein oppose dans la tuberculose rénale unilateral. *Ann. d. Malad. Oranges Genito Urinaries*, 1: 81, 1908.
32. Rovsing, T. Diagnosis of tuberculosis of the kidney in very early and advanced cases; prognosis and treatment. *J. A. M. A.*, 59: 2228, 1912.
33. Ambard and Papin. Étude sur les concentrations urinaries. *Arcb. Internat. d. Pbysiologie*, 3: 437, 1909.
34. Legueu, Ambard and Chabanier. Étude sur la concentration maxima dans sesrapports avec l'azoteme. *Arcb. Urol. d. l. Clin. d. Necker*, 1: 275, 1913.
35. Albarran, J. Exploration des Fonetians Rénales. Paris, 1905.
36. Geraghty. Tests of Renal Function. In Cabot's Modern Urology, Phila., Lea & Febiger, 1924. Ed. 2. 2: 368.
37. Folin, O. *Pbysiol. Reviews*, 2: 460, 1922.
38. Widal and Javal. Séance du 22 Octobre, 1904, Société Biologie.
39. Myers, V. C. Chemical changes in blood and their clinical significance. *Pbysiol. Reviews*, 4: 274, 1924.
40. Bandler and Killian. The practical value of chemical analysis of the blood in urological conditions. *J. Urol.*, Jan. 1928.
41. Valeur comparative des divers examens du sang et de l'urine dans la chirurgie urinaire. Reports and discussions. Trosieme Congrès de la Société International d'Urologie, Bruxelles, August, 1927.
42. Legueu and Chevassu. Traitement de la tuberculose urinaire. VII Congrés International de la Tuberculose.
43. Bernard and Heitz-Boyer. Resultats compares des differents traitements de la tuberculose rénale. Rapport a l'Association Francaise d'Urologie, 1912.
44. Pousson. XIII Session de l'Association Francaise d'Urologie, Paris, Octobre, 1909.
45. Legueu. La nephrectomie partielle. *Arcb. Urol. d. l. Clin. d. Necker*, 2: 237, 1922.
46. Kelly, H. A. and Burnam, C. F. Diseases of the Kidneys, Ureters and Bladder. N. Y., Appleton, 1914. 2: 73–85.
47. Albarran, J. Médicine operatoire des voies urinaires. Paris, 1909. P. 263.
48. Young, H. H. and Davis, D. M. Practice of Urology. Phila., Saunders, 1926. 2: 272–279.
49. Papin. Chirurgie du Rein. Paris, 1928. 2: 588–606.

TUBERCULOSIS OF THE KIDNEY*

GILBERT DALLDORF, M.D.

NEW YORK

OUR conceptions of kidney tuberculosis have been clarified recently through contributions derived from several sources.

Since the new facts seem to me to have real value and since the problem is one of great importance to surgeons, I have endeavored to correlate this information and explain some of the features of the condition which have caused us confusion in the past.

An already much quoted statement is credited to Caulk:

> There has never been in the history of medical literature a single authentic case of spontaneous healing of a tuberculous kidney. The ultimate result is always one of complete destruction.

Judging from the authors I have read this appears to be a widely accepted belief. I have found one reference, however, reporting a case of healed kidney tuberculosis, but judging from the discussion which followed its presentation, the attending society was not disposed to accept the evidence, as the patient was living and pathological proof of the lesion lacking.

In spite of this unaminity of opinion and record it seems to me, as it must to you, that the impossibility of healing of kidney tuberculosis must have some very special explanation, otherwise the condition must stand alone as a case by itself, contrary to our experience with other diseases as well as with tuberculosis elsewhere.

Those of us who find it hard to believe that kidney tuberculosis is such a malignant disease will find encouragement in an excellent morphological study recently reported by Dr. E. M. Medlar of the Department of Pathology of the University of Wisconsin. He has found definite evidence of healed tuberculosis of the kidney.

Medlar examined with great patience the kidneys of thirty cases of pulmonary tuberculosis coming to autopsy. None of them gave symptoms of clinical tuberculosis of the kidney and casual gross examination was negative. The specimens were fixed and then cut in thin strips which were inspected with a glass. Suspicious areas were removed and sectioned. Every third slide was stained for tubercle bacilli. Fully one hundred thousand slides were examined. The diagnosis of tuberculosis was made only in the face of positive evidence, either the demonstration of the bacillus or histological change commonly accepted as diagnostic of tuberculosis, or, as was the usual thing, both. Questionable lesions were disregarded.

In this painstaking manner tuberculosis was demonstrated in twenty-two of his thirty cases. In all cases it was bilateral. The locations of the lesions indicated the origin to be the blood stream. In seventeen of the cases the lesions were healed.

In establishing the origins of the lesions he considered only the smaller ones, where the precise point of origin could be more definitely observed. Two types were recognized. The most common type was of vascular origin, within the capillary of a glomerulus, within a capillary between the convoluted tubules, or within a capillary between the collecting tubules in the pyramids, in this order of frequency.

The second type of small lesion had its origin within the lumen of a tubule. They were always in association with lesions above. In six cases tubercle bacilli were demonstrated within the lumina of tubules.

Since there was nothing peculiar to this series of cases, unless perhaps that the

* Read before Section of Genito-Urinary Surgery, New York Academy of Medicine, February 15, 1928.

incidence of advanced pulmonary tuberculosis was higher than in cases you must deal with (that there is present a tuberculous focus is true of most of us and certainly of most cases of kidney tuberculosis), we may agree that renal tuberculosis is common in pulmonary tuberculosis, that it is exceedingly difficult in many cases to demonstrate, absolute proof of its absence demanding negative findings in sections of the entire organ, a truly colossal work, and that such small lesions frequently heal as does tuberculosis elsewhere.

Having arrived at a point where we can say kidney tuberculosis does heal, we must consider why and how the great discrepancy between clinical observation and investigation has arisen. To me it appears that both parties may be right. The minute lesions which are only a common incidence in the course of tuberculosis may heal, but the clinical tuberculosis of the kidney which I feel Caulk was thinking of despite his inaccuracy of expression, progressive tuberculosis as we might call it or still more expressive, renal phthisis, still remains the destructive lesion for which we know no cure.

Why one man develops the one type and his neighbor the other forms another problem. Towards its solution I can offer the opinions now current, especially on the Continent, about the behavior of tuberculosis as a systemic disease and concerning immunity toward it.

According to this teaching the primary infection in tuberculosis occurs very early in life. It is usually a pulmonary lesion located subpleurally at about the mid-level of the lung. It is associated with marked lymphadenitis of the hilus nodes. During the acute stages and when healed the lesion and the associated nodes show specific features making their identification even in adults a relatively simple matter.

Following this primary attack some resistance is present. As a result the subsequent infection, arising from organisms still harbored by the primary focus or as a reinfection from without, is different from the primary effect. The secondary infection forms the large, retracting apical scars with which we are so familiar. Histologically, the acute stage shows more production and the healed lesions form non-specific scars, in this varying greatly from the primary focus.

During this immunization the anaphylactic reaction, as the skin tuberculides and the scrofulous changes, occur. Following the secondary effects come chronic, productive and usually solitary lesions, generally in the lung but frequently in the bones or kidneys.

Viewed in this manner it will be seen, as Aschoff has pointed out, that in some respects the disease simulates syphilis, that is, it has three stages, the primary lesion, the anaphylactic changes with associated skin manifestations and lymphatic response, and the tendency for the late chronic lesions to be solitary, as is the gumma. The comparison cannot, however, be carried much farther.

I have mentioned these things because they offer us a clear conception of the manifest changes accompanying infection, indicate the widespread nature of the attack and clarify several features of phthisis of the kidney.

In the first place we may see why so frequently the lesions develop on one side and remain comparatively quiescent in the other kidney or why, developing in the lung, the kidney lesions are often apt to heal or at least not to advance. The determining factor is the degree of immunity the disease has established.

In the light of this we may translate the report Hugh Young made on the incidence of kidney tuberculosis in the sanitoria in Colorado. In ten thousand cases of tuberculosis he found only seventeen cases of kidney tuberculosis. He felt that part of the explanation might rest in the tendency for kidney cases to be kept at home and be operated rather than sent to sanitoria. This probably does afford explanation in part of the great discrepancy. I feel, however, that part of the explanation lies in the

developing lung lesions, that is, that the patients were late, tertiary cases.

One other feature of renal tuberculosis has in the past been confusing. Some cases have been reported, though they are fortunately uncommon, in which genuine tubercle bacilli were identified in urine but in which the kidney to all appearances, once it was removed, was normal. If we accept this statement as true the only explanation for it must be that the tubercle bacillus is able to pass through a kidney without exciting a lesion. This conception is difficult to accept in view of our knowledge of the behavior of pathogenic organisms in general. In the light of Dr. Medlar's work such cases must be held suspect, all the more so because, as far as I know, none of them were subjected to such exhaustive search as Dr. Medlar found necessary. Since he required one hundred thousand sections to establish the presence of tuberculosis in his series we may see how dangerous it is to say positively in such cases that tuberculosis is absent.

Remembering that the lesions he described frequently involve tubules, the explanation of the bacilluria in the absence of obvious lesions is apparent.

I may mention that several years ago Judd reported from the Mayo Foundation that they had been able to demonstrate lesions in all cases in which bacilli had been found. How extensive the necessary search was in some of the cases I am unable to learn. The presence of genuine tubercle bacilli in urethral urine is therefore positive proof of tuberculosis of the kidney, but not in itself proof of the malignant nature of that tuberculosis.

When Koch discovered the tubercle bacillus and the term tuberculosis was applied to all of the various lesions incited by that organism, several excellent clinical distinctions were lost. Phthisis, however, had rather lax usage and, while the cavitation and wasting implied is accurately descriptive of the type of tuberculosis of the kidney for which extirpation seems to be the only cure, it is probable we can find another term to apply to this dreadful form of kidney disease which does not have its indefiniteness. "Advanced," "clinical," "progressive" might well be used.

At any rate the duty seems to fall upon urologists to judge suspected cases only after very careful examination of all of the evidence available and to bear in mind, in the presence of positive animal inoculation tests, the possibility of minute foci of benign nature. Clinical experience has taught similarly, I believe, for some time.

BIBLIOGRAPHY

Aschoff, L. Vorträge über Pathologie. Jena, Fischer, 1925.

Caulk, J. R. Renal tuberculosis, *J. Urol.*, 6: 997, 1921.

Judd, E. S. Surgery of the kidney. *Minnesota M. J.*, 3: 221, 1920.

Medlar, E. M. Renal tuberculosis. *Am. J. Path.*, 2: 401, 1926.

Young, H. H. Tuberculosis of the kidney, diagnosis and treatment. *J. Michigan M. Soc.*, 25: 171, 1926.

UROLOGY IN CHILDREN*

P. M. BUTTERFIELD, M.D., F.A.C.S.

NEW YORK

IN the four years following the establishment of a special clinic for urology in children we have seen over 200 patients varying from eleven months to sixteen years of age.

It may be well to point out that in studying these patients, cystoscopy is the last thing we do, not the first. Before resorting to cystoscopy, which almost always means general anesthesia and therefore assumes the proportion of a major operation, we attempt to exhaust every other means of diagnosis through the history, physical examination, bacteriologic studies, therapeutic measures, plain roentgen-ray plates, etc. It is only after careful preliminary study that we cystoscope and pyelograph.

We are not attempting to make urology in children a specialty within a specialty but are trying to place in the hands of any who wish to use them methods and instruments that may be helpful. The more we see of children the more we are impressed that within large limits they suffer from the same ailments as do adults and in the main the diagnostic measures required are identical with those already in use.

The classification of the first hundred cases shows certain conditions readily dealt with surgically and others which present real problems with which we are at present attempting to deal in our clinic work. These are enuresis and renal infection.

ENURESIS

About 50 per cent of our cases in this class are completely relieved by suitable diet, rest, posture, atropin, gland products and local treatment of the posterior urethra.

The other half were not relieved by any of our ministrations. Those few cases of intractable enuresis which we have been able to cystoscope showed without exception definite changes at the vesical orifice such as thickening, infiltration and lipping of the posterior portion, with varying amounts of residual urine. They are similar apparently to those adult cases with nycturia with posterior vesical neck obstructions.

For the purpose of studying these cases we have devised a children's urethroscope with which we can study the vesical neck and the posterior urethra of children. Through this instrument we will be able not only to study the vesical neck but to fulgurate or use a cutting current.

RENAL INFECTION

In our series of renal infections we continue to find that 30 per cent are tuberculous. We have nothing new to offer in the treatment of kidney infections. The average case of pyelonephritis gets well under the routine use of alkalies and water. The long standing cases, which should invariably be subjected to a complete urological examination, are usually found to be draining poorly. Mechanical measures such as ureter dilation are more valuable than any medicinal or chemical treatment. Phthisis of the kidney, provided it is not bilateral, requires nephrectomy.

DIAGNOSTIC CLASSIFICATION OF THE FIRST 100 CASES

Incontinence of urine (enuresis)		37
Congenital anomalies		29
Renal infection:		
Pyogenic	9	13
Tuberculosis	4	
No pathology		7
Vaginitis		4
Stricture of the ureter		2
Perinephritic abscess		2
Calculus		2
Nephritis (acute)		1
Lues		1
Venereal warts		1
		100

Males, 70; females, 30.

Average age eight years; youngest patient, 11 months of age; oldest patient, 16 years of age.

* Read before Section of Genito-Urinary Surgery, New York Academy of Medicine, February, 15, 1928.

A BLADDER MANOMETER

FOR DIAGNOSTIC AND THERAPEUTIC PURPOSES

EDWIN W. HIRSCH, M.D.

CHICAGO

BY the proper estimation of the bladder pressure, the functional capacity of the urinary bladder may indicate the speed with which the overdistended bladder should be emptied. Urologists are familiar with the fact that

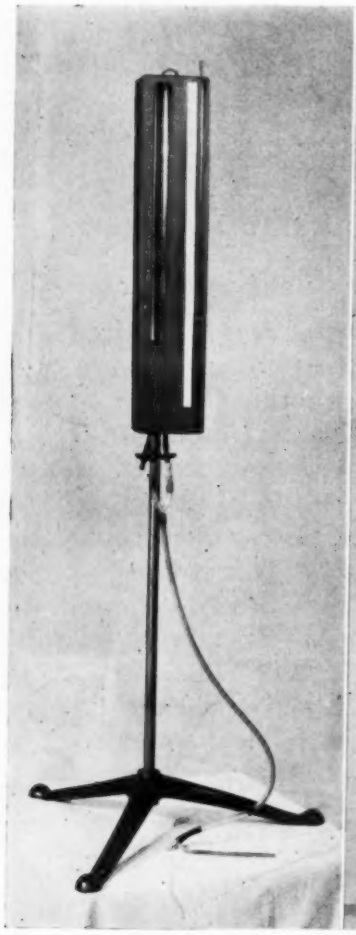


FIG. 1.

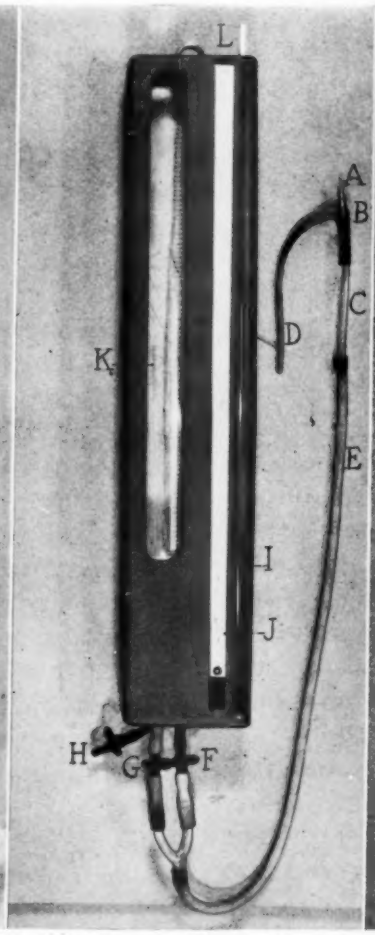


FIG. 2.

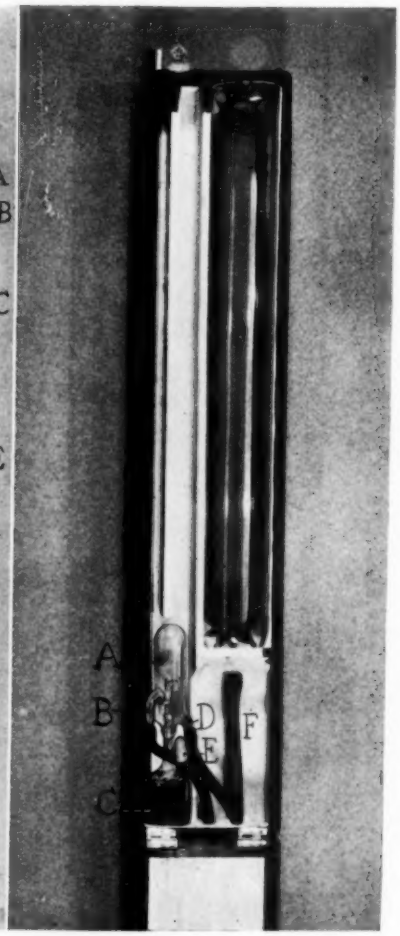


FIG. 3.

FIG. 1. Bladder manometer mounted on a stand.

FIG. 2. Bladder manometer, wall type. A, connecting tube; B, valve; C, glass observation tube; D, decompression outlet; E, extension tube; F, valve to pressure chamber; G, valve to irrigating tank; H, overflow outlet; I, slot for manometer tube; J, scale; K, tank; L, manometer tube.

FIG. 3. Inside view of bladder manometer. A, pressure chamber; B, inlet to pressure chamber; C, indicating fluid in reservoir; D, safety outlet; E, inlet for filling reservoir; F, tank tube.

be determined. This data may be utilized for diagnostic and therapeutic purposes. Heretofore, the bladder pressure has been utilized in cases of prostatic hypertrophy associated with large urinary retention to the too rapid emptying of the chronically distended bladder may result in death from hemorrhage, toxemia or uremia, and therefore urge fractional catheterization. To overcome the difficulty of repeated

catheterization, various forms of apparatus have been developed for decompressing the bladder but none of these have found general use. The principal requisite in an instrument of percision for general use is its compactness and practicability. These features the author has embodied in his bladder manometer, a piece of apparatus which may be readily used by the general practitioner. This is important for it is the family physician who is first called to relieve the case of prostatic hypertrophy with acute retention, and he should be able to manage properly the case until it may be placed in the hands of a urologist.

Bladder pressure is also of diagnostic importance in bladder disturbances and may be readily taken. The patient is placed on the physician's examining table and after the proper preparation the meatus is cleansed and a sterilized rubber catheter is lubricated and inserted into the bladder. It is connected with tube A (Fig. 2). Valve G, which leads from the irrigating tank is opened and 100 c.c. of irrigating fluid is allowed to flow into the bladder. Then valve G is closed and valve F opened. The indicating fluid (distilled water) will rise in tube L and the bladder pressure will be read from the scale J which is calibrated in centimeters and millimeters of water pressure. After noting the pressure, an additional 100 c.c. of irrigating fluid is allowed to enter the bladder and the reading obtained as before. This process is continued until the patient states that the bladder feels full. Then the tube, A, is disconnected and the bladder empties itself. The pressures are then recorded on a piece of cross-section paper and a line connecting the points indicates the bladder curve.

To decompress the over-distended bladder, a retention catheter is tied in the bladder and connected to tube A and valve B is turned so that urine will run out of tube D, a drop at a time. During the process of decompression, the bladder pressure may be taken at any time by opening valve F.

Another salient feature of this instrument is that it may be used with a cystoscope. Thus we may view the interior of the bladder and obtain the bladder pressure at the same time. This is accomplished by connecting tube A to the side arm of the cystoscope and filling the bladder through the other side arm.

By comparing the bladder pressure curves in normal individuals with those who suffer pathological bladder conditions, considerable may be learned concerning normal and abnormal bladder behavior. Sterilization of this instrument is not necessary because the bladder fluid and the manometer system do not mix.

OBSERVATIONS ON A SERIES OF NINETY-NINE RENAL NEOPLASMS*

ABRAHAM HYMAN, M.D., F.A.C.S.

NEW YORK

SINCE the report of our last publication[1] on renal tumors in 1925, twenty-nine additional cases have been observed so that the present review includes a survey of ninety-nine renal neoplasms. Pathologically, hypernephroma is the predominating type of kidney tumor. In the study of a large collected series of cases at least 65 per cent were found to be of this variety. Such a voluminous literature on the pathology and the genesis of hypernephromata has been published in recent years that we will not undertake at present an analysis of these phases.

TABLE I

	Cases
Hypernephroma	59
Carcinoma	16
Papillary Carcinoma Pelvis	9
Mixed Tumor (Wilms')	11
Sarcoma	2
Granuloma	1
Angioma	1
	99

As regards age incidence, sixty-three of the cases occurred between the ages of 40 and 50 years.

The male sex seems to be more subject to this disease, seventy-two occurring in males, twenty-seven in females. It was

TABLE II

Age Incidence in Adults	Cases
10–20	0
20–30	5
30–40	14
40–50	23
50–60	28
60–70	16
70–80	1
Total	87

observed some years ago that despite the smaller percentage in females this sex presented twice as many inoperable growths. The right kidney was affected fifty-five times, the left forty-two. A few instances of bilateral involvement have been reported.

DIAGNOSIS AND SYMPTOMATOLOGY

The diagnosis of malignant tumor of the kidney may be one of the most difficult in the realms of surgery. The symptomatology is often so complex and so protean in character as to render the clinical picture most baffling. This is especially true in those cases with a palpable tumor without gross hematuria.

The classification of the symptomatology of renal neoplasm may be grouped under six headings, the diagnostic problem varying according to the predominant symptom or group of symptoms: hematuria, tumor, pain, toxic manifestations, metastases, secondary manifestations.

The dominant symptom of renal neoplasm is hematuria, not because it is the most important from a diagnostic point of view, but because it first induces the patient to seek medical advice. And while we are discussing this symptom it may be germane to state now that the ultimate lowering of the mortality rate of this form of malignancy will be brought about not by surgery or roentgen ray or radium, but by a campaign of education of the lay public, and also of the physician. Too often the patient with a history of a hematuria which has ceased spontaneously after a day or two consults his physician to be informed that the condition can be of no real gravity. So the first dictum in the campaign to lower the ultimate mortality rate of a disease which claims 70 per cent to 80 per cent of its victims should be a careful study of the urinary tract.

* From the Surgical Service of Dr. Edwin Beer. Read before the New York Urological Association, Nov. 23, 1927.

The recognition of the importance of hematuria offers the only hope in most instances of establishing an early diagnosis. A palpable tumor and a positive pyelogram are indicative of a fairly advanced condition. Often operation years after the primary hematuria has revealed a lesion too advanced for nephrectomy. What a reduction in the mortality rate could be effected by a careful study after the first hematuria!

Table III

INITIAL SYMPTOMS—84 ADULT CASES

	Cases	Per Cent
Hematuria	36	41
Pain	23	27
Hematuria and pain	8	9
Loss of weight	6	7
Increased size of abdomen	3	3
Urinary difficulties	2	2
Gastrointestinal complaints	3	3
Metastases and miscellaneous	4	4
Varicocele	2	2

Hematuria was an initial symptom in 41 per cent of the cases, and was present sometime during the course of the disease in over 60 per cent. In fact some authors mention it as the first symptom in 60 per cent to 80 per cent, and its occurrence at some time or other as high as 90 per cent. Unfortunately hematuria cannot always be considered an early symptom. In a small percentage of cases bleeding does not manifest itself until a very short time (a matter of days to weeks) prior to the discovery at operation of a rather advanced lesion. We observed ten cases illustrating this phenomenon. In one the hemorrhage appeared three days before the operation, which revealed a large tumor. Israel[2] claims that a cure cannot be expected if the symptoms have manifested themselves longer than a year prior to operation. In most instances the bleeding is intermittent in character, the interval ranging from days to years. In general the bleeding may be described as painless. Many patients complain of a dull ache in the back, not necessarily localized to the affected side. According to Danaclara,[3] the hematuria associated with hypernephroma is not a prolonged one as in bladder tumor or in some of the so-called essential hematurias. In but one case in one hundred and forty-six did it persist longer than two weeks. Occasionally very profuse instances have been recorded where one hemorrhage has proven fatal. For some time the bleeding may remain microscopic in character. Blood casts of the ureter are not infrequently seen, and have been demonstrated cystoscopically protruding from the ureteral orifice.

Fig. 1. Large retroperitoneal tumor simulating a renal neoplasm.

Tumor formation was present in about 75 per cent of the cases, and its presence, especially when associated with hematuria, is of more diagnostic value than any other symptom. Careful bimanual palpation, especially in the lateral position, helps materially in determining the consistency, contour and mobility of the kidney.

Pain as an initial symptom was present in 27 per cent of the cases, and is present later on in at least 40 per cent. The location and character of the pain varies from a dull lumbar ache to sharp neuralgic pains radiating down the hip and thigh. A few

patients complained of severe lumbago, others of an intractable sciatica. Severe constant neuralgic pains generally indicate severe hematuria, the resulting anemia may simulate a cachectic condition. Gastrointestinal symptoms (loss of appetite,

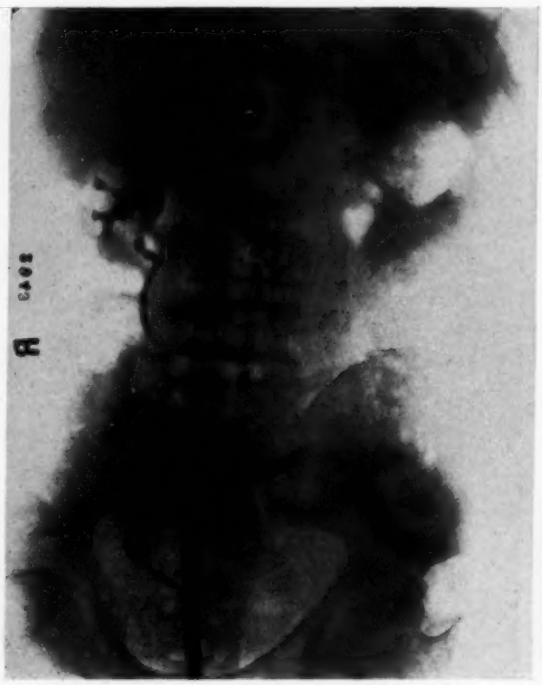


Fig. 2. Adenocarcinoma of kidney.

Fig. 3. Carcinoma of kidney, showing filling defect.

that the growth has broken through its capsule, and is inoperable. It is important in this type of case to roentgenogram the spine and pelvis for possible bony metastases.

GENERAL TOXIC MANIFESTATIONS

Under this heading may be included loss of weight, cachexia and fever. These may be the first symptoms that point to a grave constitutional disturbance, and in the absence of hematuria render the diagnosis very complex. Loss of weight and cachexia, noted in about 30 per cent of the cases, are generally not manifest until late in the hypernephromata, whereas in the carcinomata these symptoms appear earlier. Cachexia usually denotes an inoperable condition. As a rule renal neoplasms do not produce the degree of cachexia so often seen in new growths of the intestinal tract. The tumor may be present for many years with no indication of any general disturbance in the health. Following a nausea or vomiting) at times dominate the picture, giving one the impression of a gastric neoplasm. These symptoms, regarded as toxic manifestations due to absorption from the growth, often disappear immediately after nephrectomy.

Fever associated with tumor of the kidney is not an unusual occurrence, and was observed nine times without the presence of an associated pyuria. The fever may be due to an accompanying infection of the kidney or growth, or may be the result of a toxemia. Israel,[4] who first called attention to this, claimed the fever was not due to a necrosis of the growth, because the very large tumors in which we expect necrosis are not associated with fever; and in the tumors with necrosis, fever was not noted. He considers it due to toxic products generated by the tumor, and reports its incidence as approximately 20 per cent. The presence of fever may for a time obscure the clinical picture, cases of this type having been diagnosed as pyelitis or tuberculosis.

Three types of fever are described—the hectic, recurrent, and hemorrhagic; in the last the temperature always precedes or follows a hematuria. The ultimate prognosis of cases associated with fever seems to be worse, for it has been found that such a syndrome generally means a more rapid growth of the tumor, or the presence of metastases. Persistance of temperature after nephrectomy is suggestive of the presence of metastases or that tumor tissue has been left behind. A recrudescence of temperature following nephrectomy, after an afebrile period, generally signifies a fresh crop of metastases.

Fig. 4. Hypernephroma, showing large filling defect.

Fig. 5. Hypernephroma of kidney.

METASTASES

Fifteen patients had metastases when first observed. In two instances the metastases dominated the clinical picture, no suspicion being entertained of a renal lesion. Numerous instances have been reported in which a single metastases was operated upon under the impression that it was the primary growth.

The points of predilection for secondary deposits are the lungs, the long bones, liver and brain. Characteristic of carcinomata of the kidney are metastases along the course of the ureter and into the bladder.

Secondary manifestations such as edema of the abdomen and legs, pigmentation of the skin as in Addison's disease, and hypertension due to abnormal adrenalin secretion have been observed. Varicocele has been reported by French authors as a rather frequent occurrence. It differs from idiopathic varicocele in that it does not disappear on lying down. Its occurrence on the right side is of more diagnostic import than on the left. We have observed this phenomenon, the existence of which has never been satisfactorily explained, twice in the past few years. In one case so much attention was focussed on the varicocele that the renal growth was for a time overlooked.

UROLOGICAL DIAGNOSTIC PROCEDURES

The examination of the urine for tumor cells will occasionally aid in the diagnosis, as it did in two of our cases.

Roentgenography. Roentgenography, by outlining the size and shape of the kidney,

is of value. In seventeen cases distinct enlargement and irregularity of the renal shadow were noted. A normal outline, however, should not exclude a renal neoplasm, as growths in the pelvis may be present without increasing the size or altering the contour of the kidney.

Fig. 6. Carcinoma of kidney, showing filling defect.

Fig. 7. Carcinoma of kidney.

A few roentgenograms showed fimbriated streaks of calcification in the kidneys, unlike the calcified areas seen in tuberculosis, and are supposed to be of diagnostic value. We have had no experience with perirenal oxygen insufflation, or with pneumoperitoneal injections, both of which methods have been lauded in the German literature. Colonic roentgenograms aid in determining the retroperitoneal position of the growth.

Pyelography. This procedure very often plays the decisive role in establishing a definite diagnosis of renal tumor. However, the majority of patients who were pyelogrammed had symptoms pointing very strongly to renal neoplasm, and the operative findings indicated that few were early cases. In this type, the pyelogram almost always showed characteristic changes.

It is still a moot point whether early cases can be diagnosed by the pyelogram. The greatest value of the pyelogram is in renal hematuria without a palpable tumor; and as this group includes from 20 per cent to 40 per cent of the cases, its importance is readily realized. In our series of eighty-seven adult cases pyelograms were taken in forty-seven, and gave positive findings indicative of renal neoplasm forty-three times. Two pyelograms were considered doubtful; twice the picture gave practically no indication of the lesion.

Pyelograms of kidney tumors are often so varied and bizarre in appearance that it would require too much time to describe the manifold changes encountered. Suffice it to say that distortion, elongation and retraction of the calices, obliteration of one or more calices, and filling defects of the pelvis are the most characteristic findings. Large tumors may cause a displacement of the pelvis, with marked ureteropelvic deformities. The interpretation of the pyelogram is not always a simple matter. It may be impossible to differentiate between a large retroperito-

neal mass (myxoma or sarcoma) and a kidney tumor, either by pyelography or cystoscopy. The conditions simulating renal tumor in the roentgenogram are blood clots in the pelvis, uric acid stones producing filling defects, polycystic kidney, perinephric abscess, solitary cyst of the kidney, and cicatrical contraction of the pelvis following inflammatory disease of the kidney or its capsule.

Cystoscopy, Ureteral Catheterization and *Functional Tests* may yield valuable data when performed during the stage of bleeding, whereas in an hematuria-free interval very little information may be obtained. Forcible manipulation of the catheter in the renal pelvis, so as to traumatize the growth, with resulting hematuria, has occasionally aided in determining the side involved.

Functional tests in a large percentage of cases showed an inhibition of the diseased kidney. A normal indigo or phthalein test, however, is not infrequently found with renal tumors. Unlike tuberculosis and other inflammatory conditions of the kidney, there is not the same toxic effect on the rest of the organ, and the function of the uninvolved part may be slightly or not at all impaired. No indication as to the extent of the lesion can be gained by the degree of inhibition of the tests, for occasionally large tumors show comparatively little functional disability.

DIFFERENTIAL DIAGNOSIS

The classical symptoms of hematuria, tumor and pain are not always present at the same time; often one or two symptoms may be absent and the clinical picture simulate one of many renal diseases. For purposes of differentiation, Albarran[5] has classified the main objective symptoms into the following groups:

1. *Hematuria and Tumor.* This group presents no unusual diagnostic difficulties; especially since general manifestations (loss of weight, cachexia, and metastases) are often noted. Hydronephrosis and polycystic kidney occasionally simulate a neoplasm, as may also a large kidney with a calculus producing hematuria. Our attention may be so focussed on the stone that we may overlook the possibility of an associated growth.

2. *Hematuria Alone.* This group represents the greatest difficulty in diagnosis, and even after most painstaking studies embracing all our known procedures, it will occasionally be impossible to differentiate the bleeding of tumor from the so-called essential hematurias. Under such circumstances, exploratory operations may be indicated. To be considered in the differential diagnosis are: renal tuberculosis, uric acid stone, and the nephritic and essential types of hematurias.

3. *Palpable Tumor.* It will be necessary first of all to determine whether the tumor in question is renal in origin. Once this point has been established, one must exclude closed-off pyonephrosis (either tuberculous or non-tuberculous), polycystic kidney (especially when one kidney only is palpable), chronic perinephritic abscess, chronic perinephritis, and echinococcus cyst of the kidney.

THE RELATION OF EARLY SYMPTOMS AND PROGNOSIS TO PATHOLOGY, AS FOUND AT OPERATION

The question naturally arises whether patients presenting themselves within a short time after the appearance of initial symptoms (hematuria and pain) have correspondingly incipient pathological lesions. If so, is the prognosis better than in cases with a longer duration of such symptoms? Comparative study frequently proves this is not always the case, as is illustrated in Table IV.

In the majority of patients surviving operation two to four years, the initial symptoms appeared from five months to one year previously. Patients have succumbed within a year whose initial symptoms were of short duration—six days to four months.

TABLE IV

	Cases	Size of growth	Gland involvement	Invasion of renal vein	Metastases	Inoperable	Deaths within a year
I. Initial symptoms appearing 2 days to 2 months prior to operation	23	Large 14 Small 9	1	8	1	2	5
II. Initial symptoms appearing from 6 months to 1 year prior to operation	18	Larger and more fixed tumors	2	8	..	5	2
III. Initial symptoms appearing from 1 to 3 years prior to operation	15	All large growths and fixed	..	3	..	4	2

OPERATIVE CONTRAINDICATIONS

Previous experience has demonstrated that certain types of growth are not suitable for operative interference. Large fixed tumors adherent to the spine and diaphragm, and which have no mobility, are as a rule inoperable. Extension of the growth into the fatty capsule cannot always be determined prior to operation; its occurrence, however, makes the prognosis almost hopeless. Single metastases in accessible regions have been successfully removed, and their presence does not contraindicate nephrectomy. It is important that the lungs and bones should be roentgenogrammed before operation for possible secondary deposits. Involvement of the renal vein cannot be diagnosticated before operation. Extension into the vena cava may be symptomless or manifest itself by edema of the lower extremities. Such a case should be considered inoperable. The size of the growth, so long as it is not fixed, should be no contraindication to surgery. Small tumors have occasionally been found to metastasize more quickly than large ones.

DEEP ROENTGEN-RAY AND RADIUM TREATMENT

I have seen no statistics on the influence of the roentgen ray and radium on renal neoplasms, and our own are not extensive enough for us to formulate any definite conclusions. We have had no experience with the roentgen ray in the preoperative preparation of patients. Of the patients surviving operation, eight had been treated with roentgen ray or radium. Three of these had radium implanted, deep into the wound near the pedicle, soon after operation; the other five were treated after operation with deep roentgen ray. The patients so treated did not seem to do better, and the percentage of lasting results is no higher than in the first series of forty patients, who were not treated with roentgen ray. In fact, of six patients who have survived operation over four years, but one was so treated. One patient who had received more than twelve treatments, developed a local wound recurrence within a few weeks after the cessation of treatment.

OPERATIVE TREATMENT

According to Albarran[5] the average duration of the disease, if unoperated, is from three to five years. Lumbar nephrectomy is the usual procedure, the transperitoneal route being reserved for very large growths, especially the type seen in children. There were sixty lumbar and nine transperitoneal nephrectomies in our series. The general operative mortality rate reported by various surgeons is still very high—according to Albarran and Imbert,[6] 23 per cent; Albrecht,[7] 33 per cent; Voelcker,[8] 25 per cent; Israel,[4] 22 per cent; Braasch,[9] 11 per cent. Our operative mortality in sixty-eight nephrectomies was 5.8 per cent. Most of the deaths reported in

the literature are due to hemorrhage, pulmonary complications and cardiac failure. Israel calls attention to the high mortality from cardiac failure, and attributes it to a toxic myocarditis.

Table V

	Cases	
Patients operated	77	
Nephrectomies		
Lumbar	59	68
Transperitoneal	9	
Exploratory operations	9	
Deaths following nephrectomy	4	(5.8%)
Deaths following exploration	4	

RENAL VEIN INVOLVEMENT

Twenty-six cases showed extension of the growth into the renal vein. Reports as to its frequency vary from 10 per cent to 22 per cent. Involvement of the vein, even though rather extensive, does not necessarily indicate a fatal prognosis, instances having been cited in which patients have survived for years following the removal of tumor thrombi from the renal vein and vena cava. Of interest was the fact that the vein was found involved eight times in the group of twenty-three patients in whom the initial symptoms had manifested themselves within a few months of operation.

Rehn[10] has called attention to the fact that unoperated hypernephroma frequently metastasizes late; and it has been shown at post mortem that although the renal vein and vena cava were found occluded with tumor, no sign of metastases could be found. He then comments on the unfavorable results often following nephrectomy, claiming that in the course of mobilizing the kidney, the thrombi are loosened up, and thrown into the general circulation, with the result that metastases appear soon after operation. To guard against this, the renal vein should be ligated before attempting to free the kidney. We have for years ligated the renal vein as early as possible in the course of operation, but to do so as a routine before mobilizing the kidney is generally not feasible.

PROGNOSIS

Tumor of the kidney is a very malignant condition, exacting a heavy toll. In view of the late occurrences of metastases, the three year period can by no means be considered a criterion as to cure. To indicate the rather high, late mortality, approximately one-half of the patients alive at the end of the three year period succumb before the end of five years. The percentage of cures reported by different authors varies from 4 per cent to 25 per cent. As far as we have been able to ascertain from a study of our cases, approximately 15 per cent of the patients operated upon are alive and well five years after operation.

CONCLUSION

In conclusion, I wish to call attention to the great importance of an early diagnosis. This will only be accomplished by an examination of the patient during or immediately after the initial hematuria. Our only hope at present of reducing a mortality which claims at least 75 per cent of its victims is by an intensive propaganda, both among physicians and laity, to impress upon them the possible gravity of a hematuria.

BIBLIOGRAPHY

1. Hyman, A. Clinical and surgical aspects of renal neoplasms. *Surg. Gynec. & Obst.*, 41: 298, 1925.
2. Israel, J. *Folio Urolog.*, 3: 151, 1910.
3. Danaclara. *New York M. J.*, p. 1093, 1915.
4. Israel, J. Chirurgie der Niere and Harnleiters. Leipzig Georg Thieme, 1925.
5. Albarran. Tumeurs du Rein. Paris, 1903.
6. Albarran and Imbert. Tumeurs du Rein. Paris, Nasson et cie, 1903.
7. Albrecht, P. Beiträge zur Klinik und pathologischen Anatomie der malignen Hypernephrome. *Arch. f. klin. Chir.*, 77: 1073, 1905.
8. Voelcker. Spec. Pathologie und Therapie, 7.
9. Braasch, W. F. Clinical data on malignant renal tumors. *J. A. M. A.*, 40: 274, 1913.
10. Rehn. *Ztscbr. f. urol. Chir.*, 10: 326, 1922.

POSTOPERATIVE JEJUNAL ULCERS

NORMAN M. ALLEN, M.D., F.A.C.S.

DETROIT

THAT ulcers occur frequently at or near the suture line following any of the well-known types of gastrointestinal anastomoses is, I think, generally recognized by all interested in gastrointestinal surgery.

The cause of this so-called recurrence of either postoperative marginal or jejunal ulcer is unknown. Several theories have been advanced, however. Ulcers have been produced experimentally in dogs by the use of caustics, cauteries, injection of bacteria, clamps, and so forth, but no experiments have proved that these are causative agents in man.

Some of the prominent symptoms of this distressing condition may be mentioned briefly. An individual suspected of having a marginal ulcer frequently is emaciated, has a secondary anemia of greater or lesser degree, and gives a history of former gastric or duodenal ulcer. The ulcer may have been treated for a long period of time with a diet and the well-known types of alkaline treatment. After several recurrences he submits to operation and possibly one of the most common types of operation for this condition is performed, a gastroenterostomy. After a lapse of one to two years he again complains of gastrointestinal symptoms. However, the symptoms are not clear-cut for duodenal or gastric ulcer. The duration of relief after ingestion of food is comparatively short, pain is in the region of the midportion of the transverse colon, and the disease now incapacitates much more than the former duodenal or gastric ulcer.

As to the time of recurrence, I might state that we have one case in our series where the marginal ulcer occurred seven months after gastroenterostomy and another case where the ulcer did not occur until eleven years had elapsed. Balfour reported one fourteen years after gastroenterostomy.

As for the etiology of this condition, some of the causes mentioned are: (a) The use of clamps during the original gastroenterostomy; (b) the use of nonabsorbable suture material; (c) faulty technique in that the anastomosis was poorly placed, not being at the most dependent part of the stomach, or being placed too close to the transverse colon; (d) hematoma at the time of operation, the hematoma becoming infected and later causing inflammation, infiltration and possible ulceration; (e) focal infection (bacteria); (f) lack of pathology, gastroenterostomy where no pathology was present or where the original operation was done with a mistaken diagnosis, such as a gastroenterostomy being done for gastric crisis or hemorrhagic hepatitis.

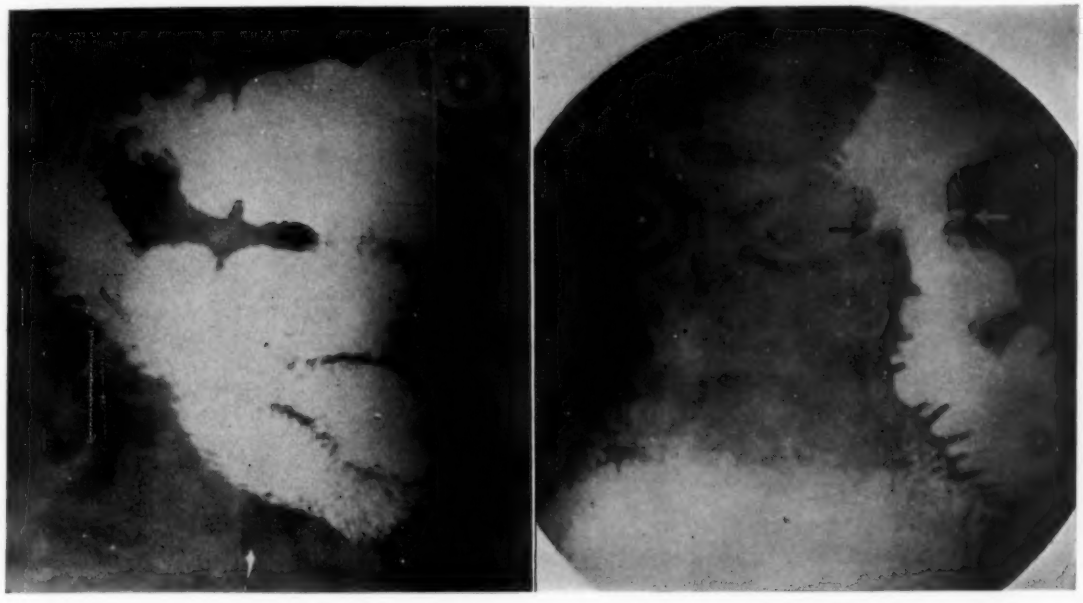
We have used the ordinary gastroenterostomy clamp in doing all of our stomach operations for several years, and as far as we were able to ascertain, clamps were used in all our cases primarily operated by others. We have used absorbable suture material in doing our gastrointestinal work for several years, without the use of linen or silk.

Hematoma, either by puncture of a small vessel or improper hemostasis at the time of operation, hardly seems possible as a definite cause when there are cases of marginal ulcer recurring fourteen years after the original gastroenterostomy.

Another cause cited is that the gastroenterostomy stoma is too small, causing excessive irritation of the margin of the stoma. We were unable to verify this in any of our cases operated, the stoma admitting the usual three finger tips and approximating the normal size of the pylorus.

The recurrence of marginal ulcers due

to bacterial infection is a possible cause. We have an impression that focal infection of bacterial origin may be the cause of the original duodenal or gastric ulcer. This also would be a reasonable explanation for the recurrence of ulcers, the cause of the secondary ulcer being the same as that of the primary. In view of this fact we felt it appropriate to cite four cases which we have picked from our hospital records to demonstrate the ability of some patients to produce ulcers regardless of what type of procedure is carried out.



A B

Fig. 1. (A) Marginal ulcer, following gastroenterostomy, indicated by arrow. (Ulcer was best shown on the fluoroscopic screen.) There is also a typical duodenal bulb deformity as a result of the recurrent duodenal ulcer. (B) Examination made after gastrectomy. There are two marginal ulcers as shown by the arrows.

CASE REPORTS*

Case 1. Male, age thirty-seven years. Was first seen at Harper Hospital, April, 1917, with a perforated duodenal ulcer. An emergency abdominal was done by one of our Harper Hospital surgeons. The perforation was sutured. The man remained in the hospital for fourteen days and made an uneventful recovery. He remained well for approximately a year when he began to have gastric distress, vomited blood and had blood in the stool. Roentgenogram at that time showed duodenal ulcer. On March 28, 1920, he again entered Harper Hospital for relief of his right upper abdominal pain. He stated that he had been under medical treatment since his former operation. Roentgenogram was positive for duodenal ulcer and operation was advised. At that time a posterior gastroenterostomy and appendectomy were performed. The omental adhesions present at the site of the former operation were not disturbed. Recovery was

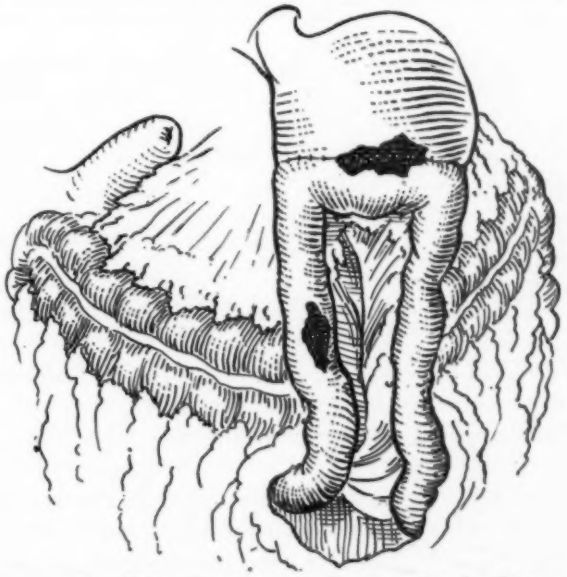


Fig. 2. Condition found at sixth operation in Case 1.

* From Surgical Division, Harper Hospital.

rather stormy but patient was discharged on April 10, 1920. Patient remained well for a period of three years when he again began to

Fig. 3. Marginal ulcer in Case 11 following gastroenterostomy.

have pain in the region of the umbilicus, worse at night, with definite relation to meals. Blood Wassermann was negative, stool positive for blood. Roentgenogram showed marginal ulcer.

Operation recommended and performed January 26, 1925. Findings at the time of operation were marginal ulcer on the jejunal side of the anastomosis. Gastroenterostomy was disconnected, ulcer resected and end-to-end anastomosis of the jejunum accomplished. The defect in the posterior wall of the stomach was closed (Fig. 1, A and B). Patient made an uneventful recovery and was discharged from the hospital February 5, 1925. After this third surgical attempt the patient was relieved of his symptoms for six months when he began again to have pain and gastric distress after eating. Roentgenogram positive for active duodenal ulcer. At this time he went to another clinic and had a partial gastrectomy performed in February, 1926. He was discharged as well and returned to his home. He again began to have gastric pain and distress seven weeks after the partial gastrectomy. Roentgen-ray examination at that time showed marginal ulcer. He returned to his former surgeon and had the marginal ulcer resected. A small enterostomy tube was inserted into the jejunum about six inches below stoma, the tube remaining in

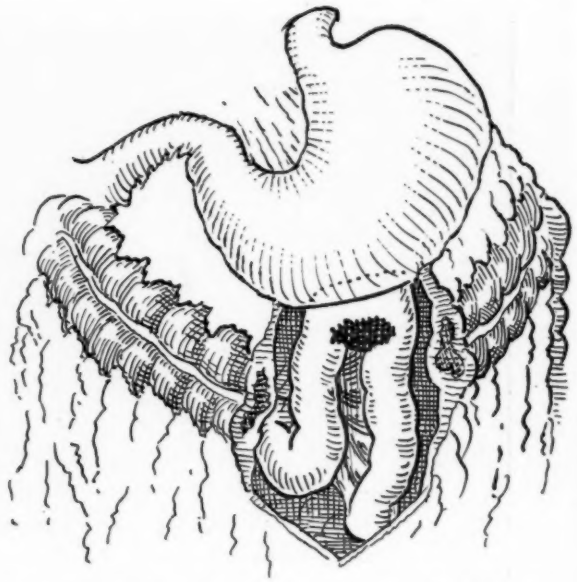


Fig. 4. Operative findings in Case 11. Marginal ulcer opposite stoma of gastroenterostomy.

place for approximately ten days to give stomach and suture line complete rest. All fluids by mouth restricted. Patient remained well for only three weeks, had to take frequent feedings, as often as 15 to 20 minute intervals, to be absolutely free from pain. On June 21, 1927, he again entered Harper Hospital with distended abdomen, upper abdominal rigidity and with a palpable mass in the upper left quadrant near the umbilicus. The diagnosis at this time was perforated marginal ulcer and operation was performed immediately (Fig. 2). Findings at operation were as follows: "Large perforated ulcer at site of gastric resection, also perforation about six inches below the stoma in the jejunum." These perforations were repaired, the leakage in the abdominal cavity being wiped out as clean as possible, but the patient succumbed the same day.

We think this will demonstrate, in a way, that frequently certain types of patients, rightly called "ulcer-producing patient," can produce ulcers regardless of the type of treatment, medical or surgical. The above patient submitted to six operations by three different surgeons and the end result was a fatality. He was able to produce ulcers more frequently after every

surgical procedure, or possibly his ulcer recurred with greater rapidity after each operation, which we think will demonstrate

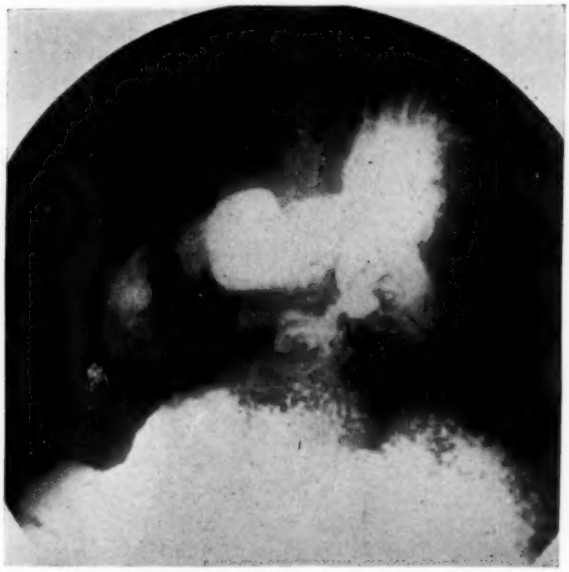


Fig. 5. Demonstrating marginal ulcer at site of gastroenterostomy in Case III.

rather clearly that the original cause of this individual's disability was still present with the resulting recurrences.

Case II. Male, age thirty-two, came with the following history: He stated that at the age of twenty-two he had distress in the upper right quadrant after eating. Pain relieved by food. The diagnosis of chronic appendicitis was made at that time and operation performed at the age of twenty-three, with no relief from his gastric symptoms. At the age of twenty-five he was again operated for adhesions with the same result. He entered Harper Hospital January 12, 1921, with general negative history but for the usual history of duodenal ulcer. Blood Wassermann and physical examination negative. Roentgenogram was positive for duodenal ulcer and he was advised to take medical treatment. He was placed on the medical service where he remained until February 13, 1921, approximately one month after his admittance, when he was again referred for operation. Findings at operation were as follows: "Large duodenal ulcer first portion of the duodenum on the anterior surface." Ulcer was excised and posterior gastroenterostomy performed. Patient made an uneventful recovery and was discharged from the hospital on the fourteenth day after operation. On September 7, 1927, he again entered the hospital with a history that he had

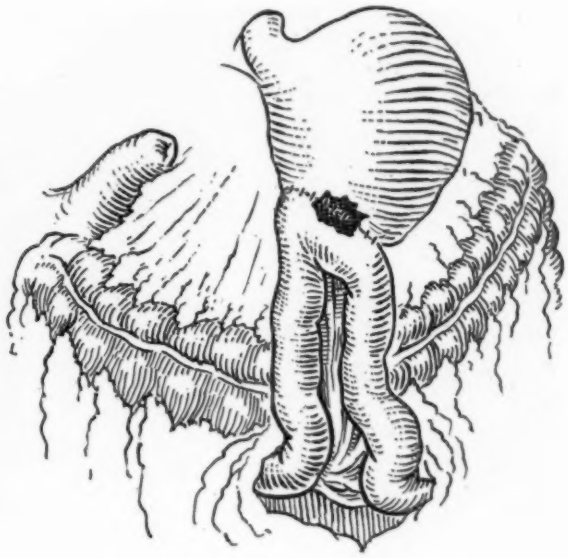


Fig. 6. Operative findings in Case III.

remained well for only four months following previous operation. He had a gastric hemorrhage in 1924, another in 1926, and had been in numerous hospitals for treatment since his previous operation. He stated that pain was present in the region of the umbilicus and that he got little relief from powders or diet. Roentgen-ray diagnosis of marginal ulcer made and operation performed October 13, 1927 (Fig. 3). Findings at operation (Fig. 4) were as follows: "Marginal ulcer present on jejunal side of anastomosis, about one-half inch in diameter." Anastomosis was disconnected, ulcer resected, posterior wall of stomach closed and jejunum closed in the usual manner. Patient made an uneventful recovery and was discharged from the hospital fourteen days after operation.

Case III. Male, aged thirty-two. Stomach trouble for twelve years coming on three hours after eating, worse at night. Noticed black stools for the first time in 1919 previous to gastroenterostomy performed for duodenal ulcer. In 1920 operation performed for marginal ulcer. In 1923 had partial gastrectomy performed because of recurrence of his symptoms. On September 23, 1927, he entered Harper Hospital with a history as stated above. Had marked secondary anemia. Roentgenogram positive for marginal ulcer (Fig. 5) and patient

submitted to operation on October 8, 1927. Findings at operation (Fig. 6) were as follows: "Marginal ulcer at site of former posterior

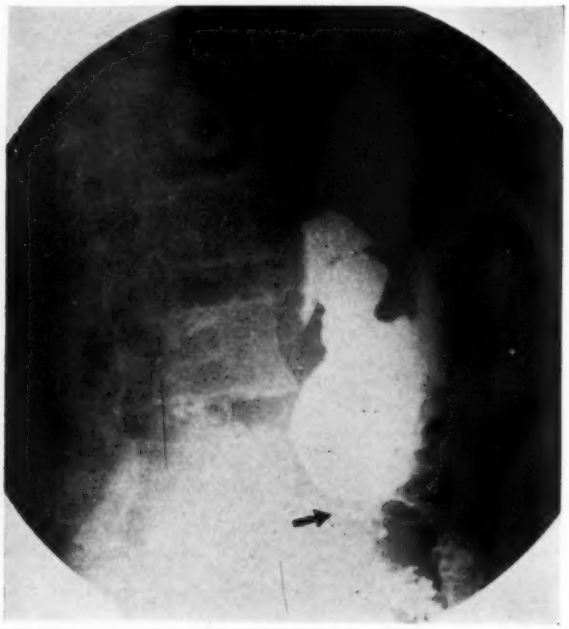


Fig. 7. Jejunal ulcer near gastroenterostomy stoma in Case iv.

Polya." Ulcer was resected, anastomosis reestablished and patient discharged October 23, 1927, after making an uneventful recovery.

Case iv. Male, age thirty-two. First had symptoms of epigastric pain and indigestion at the age of nineteen. At the age of twenty-six had operation for chronic appendicitis with relief of the epigastric distress for two years.

On November 21, 1919, patient with the above history came under the observation of the author. Physical examination negative. Blood and urinalysis negative. The diagnosis of duodenal ulcer was made at that time, verified by roentgenogram, with 20 per cent gastric retention at the end of five hours. Medical treatment was instituted and continued until April 22, 1920, when he was again returned to the surgical service for operation.

Findings at operation were those of ulcer on the posterior wall of the duodenum. Posterior gastroenterostomy performed and patient made an uneventful recovery.

Patient was free from symptoms for two years when he again began to have gastric distress, blood in stool, and pain in the region of the umbilicus after eating. Diagnosis of marginal ulcer was made and verified by roentgenogram (Fig. 7). Medical treatment was instituted but with no relief and operation was performed on October 4, 1927.

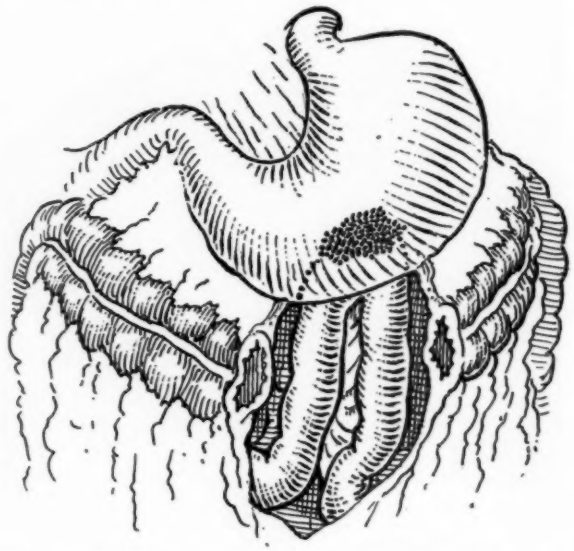


Fig. 8. Findings in Case iv at operation for jejunal ulcer.

Findings at this time were those of penetrating marginal ulcer on the jejunal side of the anastomosis. Gastroenterostomy was disconnected, large ulcer in the jejunum resected with about two inches of the jejunum (Fig. 8). The jejunum was closed by end-to-end anastomosis and the posterior end of the stomach closed. No palpable ulcer in the duodenum. Patient made an uneventful recovery and was discharged from the hospital October 20, 1927.

In reviewing these cases of marginal ulcer, eleven in number, only four of which are here reported in detail, we find that the first case had six operations, the second and third each had four operations, and the fourth case had two operations. In the last case the operation is too recent to consider in our final results. All were treated both medically and surgically for a long period of time but still had recurrence of their ulcer symptoms regardless of the treatment instituted. Some had their primary operation performed by us, others elsewhere. Some had gastroenterostomy, others gastroenterostomy with local excision of the ulcer, and still others, partial gastrectomy. All had an early recurrence, which we think readily demonstrates that

the type of operation or the surgical procedure had nothing to do with the recurrence of the ulcer.

CONCLUSIONS

(1) From our observation the treatment of choice in marginal ulcer, when the primary operation was gastroenterostomy, is disconnection of the gastroenterostomy, resection of the ulcer, repair of the jejunum and stomach, providing there is no stenosis in the pylorus, thus allowing the stomach to empty in its normal way.

(2) We hardly think it justifiable as a primary procedure to sacrifice one-half or two-thirds of the stomach for a duodenal ulcer when we can give the individual no assurance that his ulcer will not recur.

(3) Marginal or jejunal ulcers occur just as frequently after partial gastrectomy as after gastroenterostomy and when they do recur present a more formidable surgical procedure than when a simple gastroenterostomy has been performed. An individual with a gastroenterostomy developing a marginal ulcer has a much less hazardous condition than one where the primary operation was partial gastrectomy.

EPITHELIOMA OF CLITORIS AND VULVA*

Herbert Willy Meyer, M.D.

THIS patient was an Italian woman, seventy-two years of age, who was admitted to Dr. Semken's service at The New York Skin & Cancer Hospital in October 1927.

She had suffered from pruritus vulvae for twenty-five years and had always scratched herself. Six months before admission a sore developed in the region of the clitoris and the left labium. She had consulted physicians and had had radium treatment by a well known physician in Newark. The first treatment was for one hour and the second treatment was for six hours, but I did not know the quantity of radium used. After the treatments the patient suffered terribly and did not go back on account of the pain and the expense. She was referred to the Skin & Cancer Hospital in October.

The lesion was typical of an epithelioma. No inguinal nodes were palpable. Following the principles of cancer surgery as used in Dr. Semken's service I operated upon this patient October 11, under 5 ounces of ether-oil colonic anesthesia. First a bilateral inguinal node dissection was done working the tissues towards the vulva, and then the vulva, clitoris, labia majora and minora were excised in one mass with the inguinal nodes. The dissection was a block dissection comprising the entire cancer field with the exception of the internal lymph nodes along the iliac vessels.

The recovery was somewhat stormy on account of the lack of coöperation on the part of the patient, but eventually she healed and her present condition is excellent. There is no evidence of recurrence so far. The pathological report was prickle-cell epithelioma of the clitoris and vulva with hyperplasia of the inguinal lymph nodes.

* Case history, read before Section of Surgery, New York Academy of Medicine, March 2, 1928.

SURGERY OF THE GALL-BLADDER*

CLARK D. BROOKS, M.D., F.A.C.S.

DETROIT

CHOLECYSTITIS is apparently more common than formerly. The explanation may in part be found by our habits of living and eating, lack of exercise, constipation, obesity, dental and other focal infections.

People are being educated regarding dental hygiene, but, nevertheless, an ever increasing number of people are demanding that the dentist crown or apply bridges to devitalized or abscessed teeth instead of removing them as he advises and postpone treatment of pyorrhea. We believe focal infection, (sinusitis, tonsillitis, and infected tonsil stumps) to be a very important factor in the etiology of cholecystitis. Every surgeon of extensive clinical experience has noticed the frequency of cholecystitis following acute tonsillitis and other definite focal infections. A few years ago the writer in one week saw and operated upon two cases of acute gangrenous cholecystitis which developed after a marked attack of acute tonsillitis with chills and fever. After these patients had practically recovered from the throat infection, they developed pain in the gall-bladder with fever and chills. Operation revealed an acute gangrenous cholecystitis. As in the treatment of ulcer of the stomach and duodenum, it is important that cases of cholecystitis have good medical care. We believe that by good medical care many of the mild cases of short duration will be relieved of symptoms and will not later need operation.

In addition to the removal of all sources of focal infection, medical treatment may sometimes include duodenal drainage (Lyon). If patients have gallstones or have had definite colic, medical treatment should not be long continued.

In our opinion almost all of the cases of well marked cholecystitis have accompanying hepatitis and cholangitis which if allowed to continue result in further damage to the biliary ducts. Much of the morbidity and mortality after gall-bladder operations are due to delay in operation.

It has been well established that there is more cholesterol in the blood in pregnancy. Many of these patients first had an attack of cholecystitis or actual colic in the later months of pregnancy. It is quite important that patients with early symptoms should receive treatment. The laboratory gives invaluable diagnostic aid in blood chemistry and should be used more and more by the clinical surgeon.

SYMPTOMS

The early symptoms of cholecystitis are gas distress in the epigastric region, usually occurring soon after a heavy meal or at irregular intervals. Later as the pathology increases this distress occurs at more or less infrequent intervals, especially at night. This symptom appears to depend as much on the quantity of food as the quality, with the usual exception that fats are not well tolerated. As attacks become more and more marked, burning in the epigastric region occurs which may last from one half hour to several hours a day, with intervals of perhaps weeks without symptoms. These early symptoms we believe are due to pylorospasm incident to the inflammation and obstruction in the cystic duct and gall-bladder, and interference with emptying time of the gall-bladder, usually with tenderness over the gall-bladder.

The symptoms of cholecystitis vary with the type and extent of infection and whether or not there are stones. Many of the symptoms noted in patients with long

* From the clinic of Brooks, Clinton, Ashley and Weaver. Read before the Detroit Academy of Surgery, January 19, 1928.

standing cholecystitis are those of complications such as adhesions interfering with the duodenum or common duct, and drainage from the liver and pancreas. Jaundice is a symptom which is relatively uncommon in the majority of early cases of cholecystitis and a rather common symptom in late cases. Chills and fever are quite common in acute cases and unless they occur soon after a general infection, such as acute tonsillitis, they will usually have associated stone which causes a sudden blocking of the cystic duct, a condition very common in gall-bladder disease. This is also noted in acute liver abscess. Pain is usually more or less constant, especially when hepatitis accompanies cholecystitis, and in the long standing cases may be permanent.

During the past few years there has been a large amount of experimental study made to determine the functions of the liver, gall-bladder and ducts. This study has added considerably to our knowledge of these organs. We too have made several clinical observations which, in our opinion, have assisted us in preoperative and postoperative treatment of gall-bladder cases.

In seven of our cases of cholecystitis, so diagnosed by clinical study and in which the Graham-Cole tests showed good concentrating and poor emptying function, we rechecked the cholecystography test. After obtaining plates showing good concentration, we gave these patients mxv of dilute hydrochloric acid to take with their fat meal. In six cases we concluded that the emptying function was normal. On one no change was noted.

We tried duodenal drainage on a series of ten patients, using first Epsom salt solution as advocated by Lyon-Mellzer; two or three days later we attempted a second duodenal drainage using dilute hydrochloric acid solution (1 dram to 1 pint), and have found that in seven patients bile appeared in the drainage in much larger quantities in about one half the usual time. We put these patients on a diet similar to the one suggested by Moynihan with a few modifications, such as the following:

Breakfast. Orange, or grapefruit, cereals with milk or cream, eggs boiled or poached, weak tea or coffee, and toast. No fresh bread or rolls.

Luncheon. Bouillon or soup, vegetable or fruit salad with French dressing or lemon (no oily dressings). Vegetables with vinegar, sandwich with dill pickle, buttermilk or milk.

Dinner. Lean meats, potatoes, beets, carrots, cabbage, cauliflower, sauerkraut, salads as above. Desserts, ice creams, ices, puddings, weak tea or coffee. No pastry.

We add four suggestions to this diet list.

1. Masticate food well (see that patients have good teeth).
2. Do not drink with food.
3. Eat something sour with each meal.
4. Do not belch gas.

When you inquire what these patients have been eating, you will find that they have willfully refrained or have been advised to refrain from many of the above mentioned foods. Yet many of them formerly enjoyed eating them before they began to have discomfort. If for economic reasons they cannot obtain these things, we prescribe either dilute hydrochloric acid after meals or alkalies before meals. Under this routine many of these cases are symptom free.

It occurred to us that we should attempt to find out at the time of the operation what the effect would be upon distention of the gall-bladder, which is always present after fasting, if we gave a dose of dilute acid after the evening meal and 4 oz. of orange juice (unsweetened) two hours prior to operation. We noted that in these patients the gall-bladders were not nearly so tense and they emptied much more readily on pressure, but the more striking effect was the fact that these patients seldom vomited after operation whether we performed cholecystectomy or cholecystostomy. We were surprised to see how little discomfort or gaseous distention they suffered.

Enemas were usually effectual on the second day.

Most cases of empyema of the gall-bladder are accompanied by cholangitis, choledocholithiasis, varying degrees of intrahepatic cholangitis, hepatitis and pancreatitis, and a number will have auricular fibrilliation. They may have had chills and fever, nausea and vomiting for a few days, and usually are dehydrated with a mild to severe acidosis. It is obvious they need fluid administered orally, saline by hypodermoclysis and by rectum. Glucose intravenously is also beneficial. Hypertonic saline solution (2 per cent) by mouth frequently stops the nausea and vomiting. Many patients with this disease show evidences of myocardial degeneration and may need digitalization. The above treatment for a few hours at least will usually make the patient a better surgical risk than if the operation were performed immediately; also the surgeon may be able to do a one-stage operation instead of a preliminary cholecystostomy with cholecystectomy later.

Immediately after operation we must institute supportive treatment as above to counteract the dehydration and acidosis. It is our practice to prescribe on the second day suitable doses of dilute hydrochloric acid daily after meals.

Surgical treatment is not indicated in the early types of non-calculus cholecystitis. At times there will be an association of intestinal stasis usually accompanied with headache. This should be corrected by diet and appropriate treatment. If the symptoms do not subside after a few weeks of medical treatment, including duodenal drainage (Lyon) and exercise when indicated, it is very important to check up the gastrointestinal tract by a thorough examination employing blood Wassermann, gastric analysis, complete gastrointestinal roentgenographic series as well as cholecystography as an aid to diagnosis. If possible, this roentgen-ray examination should be made when the patient is in best condition and not immediately after an attack of pain. It is of especial importance in the treatment that these patients do not have an unnecessary operation for appendicitis on merely the roentgen-ray diagnosis of either appendix retention or non-filling. While it is probable that pylorospasm is a frequent symptom of both appendicitis and cholecystitis, it is not an infrequent occurrence to examine patients with well marked cholecystitis who have had their appendix removed a few weeks before and who never presented appendix symptoms. It will also be well to remember the frequency of abdominal pain and distress occurring early in hyperthyroidism.

It will be difficult at times to know how long to continue medical treatment, after making sure of a correct diagnosis. If the symptoms do not improve or disappear after a few weeks, we question the advisability of further medical treatment. At times a second or third Graham test should be made on these patients who have had previous negative tests. We believe this is especially valuable in cases without previous attack of gallstone colic. If the second Graham test is positive and the clinical symptoms are present, the best results will be obtained by surgery. At this time, most of the pathology will be confined to the gall-bladder. With delay the pancreas and the ducts, especially the smaller biliary ducts, will suffer permanent damage.

In cases with gallstone colic, when the pain has been more or less sharp and clear cut and when we suspect stones, we believe that the patient should have a shorter period of medical treatment. In the ordinary case, however, some medical treatment and a careful check up of the patient's condition should always be a preoperative procedure.

JAUNDICE

Jaundice appearing at any time in the course of gall-bladder disease should be looked upon as a serious symptom. Jaundice of mild types which last more than a week or two or which recur fre-

quently should not be treated too long medically on account of the damage to the liver. Jaundice which appears soon after an attack of colic is usually due to stones obstructing the hepatic or common ducts. Slowly developing jaundice without a history of previous pain is one of the symptoms of malignancy in which the common duct is involved. We believe that surgical gall-bladder drainage should be performed on all patients whose jaundiced state does not improve within a few days to weeks, or in those patients who have recurrent jaundice. The treatment of this class of patients will tax the experience of the family physician, internist and surgeon. Very serious damage to the liver, pancreas and myocardium follows jaundice if long continued.

The first problem concerns the nature of the obstruction. This may be a deciding factor in the second question, the time to operate. The third question is usually left to the judgment of the surgeon. How much surgery should he do?

Naturally the tendency is to defer surgical intervention, if possible, until the patient becomes a better surgical risk. Blood count, blood clotting estimation, blood frigility and Van den Berg tests are of value in giving some idea of the condition of the patient. Calcium chloride solution intravenously, as suggested by Walters, and small direct blood transfusions of 200 to 300 c.c. repeated, rather than one of larger amount, are of great value and will aid in shortening the clotting time. In severe cases blood transfusion should precede any operative measure. Glucose intravenously is of value. The liver cells cannot function properly on account of the intrahepatic pressure, and large quantities of bile are thrown into the circulation to be partially eliminated by the kidneys and skin. The obstruction may be so near the duodenum that no pancreatic secretion will come through into the intestine. In that case operation should be undertaken fairly early if we hope to have a live patient. Because of lack of bile in the intestine these patients are constipated and may be distended. Occasionally ox-gall, or preferably bile and fruit juices, with or without glucose, are of benefit. Duodenal drainage may be of benefit.

If the attempt is made to increase our patient's chances of withstanding operation by the above methods, and the Van den Berg frigility tests and clinical observation inform the surgeon that his patient is not improving, then he must decide to intervene in spite of the handicap. What should be done is often a question; suffice it to say that just as little as is necessary to get drainage.

As Weber[4] suggested in 1903, a close parallel may be drawn between the kidney and the liver and it occurred to us that many of these cases developed an acute hepatitis following the sudden relief of back pressure in the intrahepatic ducts, just as we used to see acute urinary suppression after a one-stage prostatectomy. We have made it a practice during the past few years to clamp off the drainage tube and allow it to drain only at intervals of two or three hours for a few minutes at a time, thereby maintaining with good results some back pressure in the ducts. Formerly these cases drained large quantities of bile for a day, then bile and blood, then blood and gradually they became cold, pale, weak, exhausted, and finally died. Since we began to allow fractional bile drainage the above picture has not appeared so frequently.

Occasionally, after the drainage tube have been removed, thin yellow and perhaps white bile escapes from the sinus. The patient complains of marked burning and tenderness of the skin. We may even have second degree burn due to the escape of pancreatic secretion. Frequent changing of the dressings and soothing ointments will be of benefit.

We have operated upon a few patients in whom we left common duct stones with and without cognizance. Then we have noted other cases in which there appeared to be a benign structure of the common

duct which we could not account for as being traumatic. These probably belong in that class described by Judd and Counseller.[3] They have come to the conclusion that these strictures are the result of long-standing intermittent obstruction producing obliterative changes in both the extrahepatic and intrahepatic ducts with varying degrees of biliary cirrhosis. Many of these cases refuse second or third operations. We attempt duodenal drainage at intervals of two to four weeks, put them on modified gall-bladder disease diet, with dilute hydrochloric or nitrohydrochloric acid with each meal. Many of them have gone along for several months to a year without symptoms of biliary obstruction.

GALLSTONES

The chief cause of gallstones is stagnation of bile in the presence of bacterial infection in the gall-bladder and ducts, as a result in most cases of hematogenous infection. The common type is cholestrin stone with deposits of bilirubin-calcium, often multiple and faceted. The white, nearly pure, calcium stone is not so frequent. While most gallstones form in the gall-bladder, there is no question that they also may form in the hepatic ducts and in the liver.

In calculus gall-bladder disease the symptoms depend upon the size and position of the stone. If the stone is small enough to lodge in any portion of the cystic duct, gall-stone colic ensues during the disturbance. There is very little pain from the stone while it is in the gall bladder, but chills and fever may accompany the blocking of the cystic duct and so-called empyema of the gall-bladder follows. In the ordinary infected gall-bladder there is seldom more than one or two chills following blocking of the cystic duct and these chills are usually ten to twenty hours apart.

When chills occur from four to ten hours apart, they usually indicate advancing cholangitis due to hepatic duct involvement and should be considered very serious. Stones lodging in the hepatic or common duct usually cause deeper seated pain than accompany those in the cystic duct, and the scapular pain may be more severe than the pain over the liver anteriorly. Jaundice of some degree usually occurs within twenty hours after lodgment of calculi in the hepatic or common duct. Stones in the ampulla of Vater cause severe symptoms, for here we have in addition to liver infection that due to obstruction of the pancreatic duct. With the onset of pancreatitis there always will be very severe pain, usually high temperature rapid pulse and rigidity of the upper abdominal muscles as in perforated ulcer. The pain in the scapular region is usually so severe that it will not be relieved by the ordinary dose of morphine. Chronic pancreatitis and hepatitis, cancer of gall-bladder and ducts, diabetes, myocardial changes and hypertension are complications following long continued cholecystitis with or without stones. Many of the above conditions would be avoided by earlier operation.

Before the classical researches of Graham[1,2] and his colleagues with the dye, the roentgen-ray was of doubtful diagnostic value in the usual case of cholecystitis. It was of great value, however, in differential diagnosis of disease, especially ulcer of the duodenum and stomach and diverticula of the duodenum. Now, whether the dye is given by the oral or intravenous method, we think that it is a very important step in diagnoses. We believe it is of so much value that we consider it part of every examination in suspected cholecystitis. Roentgen-ray study of the stomach and duodenum should always be made in connection with the Graham-Cole gall-bladder test. In acute or subacute types of cholecystitis, especially when associated with fever or marked tenderness, we do not advise the Graham-Cole test. We must remember that a positive Graham-Cole test may be obtained a few days after a well marked attack of cholecystitis or catarrhal jaundice, and a negative test a few weeks later. This

we conclude is evidence that in the one case the liver is not able to concentrate the dye or that there is cystic duct obstruction, and in the other that drainage has become established. We believe that a positive Graham test is definite evidence of cholecystitis but do not advise operation on such patients unless there is clinical evidence of local disease.

We have performed cholecystography on 450 patients. Of these 101 have been operated upon with operative confirmation in 92, giving a percentage of 91.1 correctness of diagnosis by this test. The diagnosis of gall-bladder disease is often difficult and it is obvious that even with this test there will occasionally be seen the border line case which will offer chances of error. Familiarity with the method is essential in order to minimize mistakes, our most flagrant mistakes being with our first cases.

We have used the oral method entirely because of its simplicity and total freedom from severe reaction, as all of this series have been ambulatory office cases. Reactions have been negligible and even in those patients who have complained of vomiting and diarrhea and in those showing apparently poor solution of capsules, we have seldom found an appreciable effect on the quality of the gall-bladder shadow. When there is a doubt as to this, the examination is repeated.

The Graham-Cole method is essentially a test of the function of the gall-bladder. This latter consists of reception of the bile, storage and concentration of the bile during fasting and discharge during digestion. Failure of the gall-bladder to be visualized during the Graham-Cole test does not mean a failure to fill, as some believe. It may mean failure of liver function or loss of concentrating ability by the gall-bladder mucosa, as well as blockage of the cystic duct or displacement of the bile by stones in the gall-bladder. It is not only necessary that the bile enter the gall-bladder; it is essential that it be concentrated there in order to give a good shadow on the roentgen-ray film.

Disease of the gall-bladder may be inferred if the organ is not visualized, if the shadow is not as dense as normally seen, or if the emptying function after taking food is absent or markedly impaired. In addition we often are able to demonstrate enlarged gall-bladders, adhesions, stones as negative shadows which would not otherwise be seen and anomalies. The Graham test is also important in differential diagnoses of kidney calculus.

From our experience with the test we feel that a very valuable diagnostic aid has been added to our armamentarium. Mistakes will be made but with increased use, careful checking of operative and pathologic findings, repetition in doubtful cases and correlation with clinical findings, our accuracy should materially improve. Failure of the gall-bladder to be visualized has been our most reliable sign of disease, outside of actual demonstration of stones.

If gallstone disease is found, we think the sooner operation is performed in the usual case the better. To prolong medical treatment in gallstone disease with symptoms is to invite complications which are usually the cause of incomplete recovery after operation. In addition to this, the extent of such complications has rendered the patient unfit for the operation of choice and makes it necessary to perform one of expectancy such as cholecystostomy, and later a secondary operation may be necessary for removal of the gall-bladder or drainage of the ducts. In this series of cases, we find when operations are performed within a few months or within a relatively short time after obtaining well marked clinical evidence of cholecystitis, either non-calculous or calculous, that secondary operations are seldom requirod, complications few, and the results are goed. We have never seen or operated upon cancer of the gall-bladder where the case had not had symptoms for years of cholecystitis and stones. It is reasonable to believe that it is very unsafe for the patient to have prolonged medical treatment in well marked cholecystitis unless the symptoms are relieved. It is fully as important not

to operate on the gall-bladder tract unless we have definite clear cut evidence of local disease.

people not in good condition such as the elderly patient, cholecystostomy will be the method of choice. In our experience

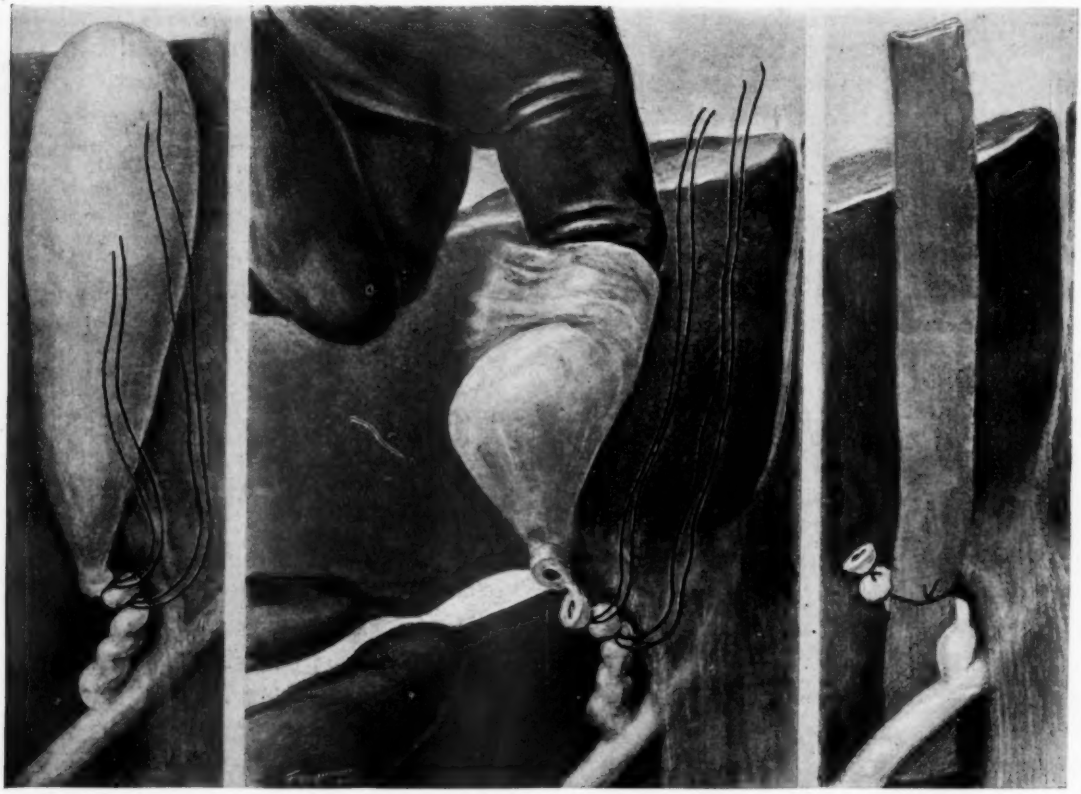


Fig. 1. Fig. 2. Fig. 3.

Fig. 1. Technique of cholecystectomy. Two sutures are placed and tied lightly around cystic duct.

Fig. 2. Finger is placed within gall-bladder and flexed, putting tension on cystic duct which is divided above sutures.

Fig. 3. Soft rubber drain is placed below stump of duct and tied lightly in place with ends of lower suture which are tied around duct.

TYPE OF OPERATION

We believe that cholecystectomy will be the method of choice in the majority of gall-bladder operations. In atrophic or thickened gall-bladders or with obstruction of the cystic duct or when we have reason to believe the gall-bladder has ceased to function, the best results will follow cholecystectomy. It is extremely doubtful if the gall-bladder ever functions normally after cholecystostomy, even if it does not cause further symptoms. There will always be a number of patients in whom a cholecystostomy will be the safest. In cases associated with jaundice or marked cirrhosis or hepatitis, in cases of marked common duct obstruction, and in gallstones seldom reform after the age of fifty when patients have good medical care and have eliminated all possible avenues of focal infection. We question the right of any surgeon to determine before hand as to whether he should perform cholecystostomy or cholecystectomy, except in some of the above conditions. Cholecystostomy can easily be performed with local anesthesia. We have found many times that choledochoctomy along with cholecystectomy was a very satisfactory operation. By this method of drainage (Figs. 4 and 5), using either the cystic or common duct, we safely perform cholecystectomy when without this drainage cholecystostomy and perhaps a second operation would be necessary.

It will be advisable in these cases with duct drainage to insert a small amount of saline solution in the tube each time it is allowed to drain. We believe the tube should be unclamped about half an hour every four to six hours.

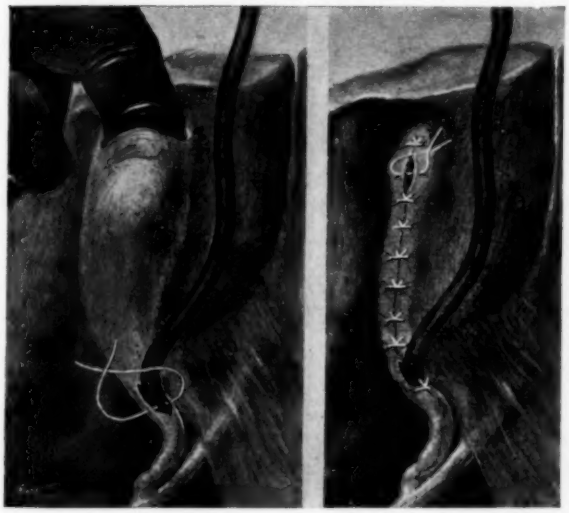


Fig. 4. Fig. 5.

Figs. 4 and 5. The finger is inserted into the gall-bladder and flexed, putting the cyctic duct on the stretch. A small incision is made in the upper part of the cyctic duct, a catheter is inserted into the duct and sutured in place. The gall-bladder is then removed. With this technique the good effects of drainage are obtained with cholecystectomy.

In addition to careful individual treatment of every case, it will be of the utmost importance that all cases should be brought in a safe state for operation by preoperative treatment. Local anesthesia should play a part or be used entirely in all very sick gall-bladder cases. A small incision will be sufficient and is easier closed in desperately sick patients. Blood loss and long operations will invariably be fatal to gall-bladder cases with jaundice at operation.

Good exposure is all important in operation on the ducts, and when patients are in good condition we make it a routine procedure to remove the appendix as the first step in every gall-bladder operation. The stomach, duodenum, spleen and liver should always be examined in every case. It is our practice in most cases to aspirate the gall-bladder contents after carefully walling off the gall-bladder tract with pads. After aspiration is completed the gall-bladder is opened and carefully inspected. If we are not convinced that there is definite local disease, no matter what our clinical diagnosis we do not advise cholecystectomy. There is usually evidence in the liver of chronic hepatitis. A more careful examination of the ducts can be made after the gall-bladder is bisected to the cystic duct or even to the common duct. It will be well to remember that a blue, normal appearing gall-bladder may be the site of marked strawberry cholecystitis or gallstones.

Fig. 6. Cholecystectomy in acute cases. When gall-bladder wall is edematous or gangrenous, gall-bladder is incised down to cyctic duct and mucosa peeled out.

At times in the care of very sick people with gangrenous gall-bladder, we are satisfied to remove the mucosa of the gall-bladder and drain the cystic duct (Fig. 6).

TABLE 1

Number of cases operated upon, 101 (Nov. 27–27)
Number of examinations made, 450 (Nov. 27–27)

Authors	Method of administration	Diagnosis of Normal Gall-bladder			Diagnosis of Pathological Gall-bladder			Total per cent of correctness by cholecystography
		Normal at operation	Pathological at operation	Per cent of correctness	Normal at operation	Pathological at operation	Per cent of correctness	
Dr. Brooks Dr. Clinton Dr. Ashley Dr. Weaver	Oral	21	6*	77.8	3†	71	96	91.6

* Two of these were among our first cases. Later examination of films showed definite evidence of cholecystitis present, our interpretation being at fault. Two others were border line cases, showing roentgenologically a very fair function but the pathological report at operation was chronic cholecystitis. The other two showed good function but operation showed adhesions and other macroscopic evidence of cholecystitis. There were no stones. There is no pathological report on these.

† Two of these were border line cases. The other gave no shadow but patient might not have followed instructions properly as to eating, etc.

In every case in fair condition the common and hepatic ducts should be carefully examined so that stones may not be left behind. A second operation on the gall-bladder tract, especially when the gall-bladder has been removed at the primary operation, may be a formidable affair. It is reasonable to suppose that when stones are present at the first operation and the patient has return of symptoms within a few weeks or months that all the stones were not removed.

COMPLICATIONS DURING OPERATION

Great care must be taken to obtain good exposure, especially in operation on ducts, since hemorrhage will then be avoided. In performing cholecystectomy we believe that if two sutures are used to ligate the cystic duct and artery before cutting above it will be safer (Figs. 1 and 2). If clamps are used, they may become unclamped and sharp bleeding follows. Most of the injury to the duodenum, common and hepatic ducts is due to poor technic at this time of operation. It has been our practice to drain fossa as in Fig. 3.

In cases of long continued jaundice, either secondary to stones or following common duct obstruction, the operation of choledochoduodenostomy or cholecystogastrostomy will be necessary and should be more frequently used.

COMPLICATIONS AFTER OPERATION

Bleeding may occur in all cut surfaces in jaundiced cases. It is best combated by using blood transfusion with glucose and saline, hemostatic serum, and by avoiding operation in a jaundiced case which is improving upon medical treatment. The patient should never be operated upon in a jaundiced state until an attempt is made to improve his condition.

A few cases will be seen whose symptoms persist after operation. In some of these stones were not removed at the first operation and in others the ducts were so thickened before operation was performed that they interfered with drainage. In a certain number of cases a second or even third operation will be necessary. In biliary fistula which continues after operation one must conclude that injury to the ducts occurred at the time of the operation or that there is an unremoved stone or other obstruction in the common duct. In cases which improve for a few months to years after cholecystostomy then have recurring symptoms, there may be a recurrence of gallstones, or obstruction in the common duct; secondary operations are performed

TABLE II

SUMMARY OF CHOLESTOGRAPHIC FINDINGS IN ALL CASES TO DATE

Author	Method of Administration	Diagnosis of normal gall-bladder			Diagnosis of pathological gall-bladder			Total percentage of correctness of diagnosis
		Normal gall-bladder at operation	Pathological gall-bladder at operation	Percentage of correctness of cholecystography	Normal gall-bladder at operation	Pathological gall-bladder at operation	Percentage of correctness of cholecystography	
Sosman-Whitaker Edson (24).	Intravenous	4	1	80	1	37	97.3	95.4
Carman (6).	Intravenous	0	9	0	0	41	100	78
Carman (6).	Oral	21	18	53.9	0	103	100	87.3
Cohen and Roberts.	Intravenous	2	0	100	1	7	87.5	90
Wilkie and Illingworth (27).	Intravenous	21	2	91.3	0	32	100	96.4
Gossett and Lowey (12).	Mostly Intravenous	21	0	100	1	10	91	96.9
Stewart and Ryan (25).	Oral	1	0	100	2	21	91.3	87.5
Jewett (15).	Oral	2	0	100	1	10	91	92.4
Winslow and Melgard (28).	Intravenous	1	0	100	0	6	100	100
Nemours-Auguste (25).	Intravenous	3	0	100	0	5	100	100
Kannelson and Reimann (16).	Intravenous	1	0	100	0	3	100	100
McCoy and R. S. Graham (19).	Intravenous	8	0	100	0	16	100	100
McCoy and R. S. Graham (19).	Oral	0	0	0	0	2	100	100
Totals of others				74				98
Graham, Cole Copher-Moore.	Mostly Intravenous				4	143	97.3	97.3

Percentage of correctness in 446 cases of all authors with a diagnosis of pathological gall-bladder, 97.8.
Percentage of correctness in 115 cases of all authors with a diagnosis of normal gall-bladder, 74.
Percentage of correctness in 380 cases of all authors by intravenous method, 95.
Percentage of correctness in 181 cases of all authors by oral method, 89.

DIAGNOSED PATHOLOGICAL

Number showing no shadow of gall-bladder,..... 100
Number showing poor shadow of gall-bladder..... 117
Number showing good or fair shadow with poor emptying function..... 99
Number showing negative shadows of stones..... 18
Diagnosis normal-good shadows which emptied well after fat meal 117

if the symptoms persist. It will be well to open the common duct and explore carefully. At times an indwelling tube should be used for permanent internal drainage, or an anastomosis with small permament tube to stomach or duodenum. Great care should be used to get all patients who are to undergo a second gall-bladder operation in as good condition as possible.

RÉSUMÉ OF 830 CASES OF BILIARY DISEASE OPERATED ON DURING THE LAST EIGHT YEARS

Male patients	198
Female patients	632
Youngest patient	19
Oldest patient	86
Average age	39
Average duration of symptoms	4½ yrs.
Average days in hospital	15 days

ACUTE CASES

Empyemas	132
Gangrenous cases	72
Perforated cases	8
Cases with local peritonitis, cholangitis and pancreatitis	155
Cases with acute hemorrhagic pancreatitis	5
Cases with jaundice at time of operation	34
Cases with stones	188
Cases without stones	16

CHRONIC CASES, 626

Cases with stones	415
Chronic infected or strawberry type	211
Cases with cirrhosis	27
Cases with septa	15
Cases with jaundice at time of operation	22
Cases with stones in common or hepatic ducts	9
Cases of carcinoma of gall-bladder	3

TYPE OF OPERATION

	Acute Cases	Chronic Cases
Cholecystectomy with soft rubber drain down to site of operation	4	308
Cholecystectomy with drainage of cystic duct	80	157
Partial cholecystectomy with drainage of cystic duct	34	21
Cholecystostomy	86	130
Cholecdochotomy and removal of stones from common or hepatic ducts	0	9
Choleduodenostomy	0	1

OPERATIVE MORTALITY

23 cases	2.77 per cent
5 cases acute hemorrhagic pancreatitis.	
5 cases gangrenous cholecystitis.	
3 cases toxic jaundice and pancreatitis.	
2 cases intense jaundice, postoperative hemorrhage.	
2 cases embolus, 10th and 11th day.	
2 cases pneumonia.	
2 cases cardiac dilatation.	
1 case bile peritonitis.	
1 case intestinal obstruction.	
1 case with pneumonia.	
1 case with cardiac embolus	
2 cases with peritonitis and septicemia.	

SUMMARY

1. A correct diagnosis is very essential before any treatment is given in gall-bladder disease.

2. In cases not responding well to medical treatment, further delay in surgical treatment is the cause of much of the later complications.

3. Good exposure and surgical experience is important in dealing with the technical factors in operation on the gall-bladder duct.

4. The results of gall-bladder surgery are very satisfactory to the patient, if the diagnosis is correct and the operation has been made to suit his condition.

5. Good medical treatment is important preoperatively and postoperatively in diseases of the gall-bladder.

BIBLIOGRAPHY

1. Balfour, D. C. Problems in the surgical treatment of peptic ulcer. *S. Clin. North Am.*, 7: 1422, 1927.
2. Graham, E. A. Present status of cholecystography and remarks on mechanism of emptying of gall bladder. *Surg. Gynec. & Obst.*, 44: 153, 1927.
3. Judd, E. S. and Counseller, V. S. Effects of obstructive lesions of the common duct of liver. *J. A. M. A.*, 89: 1754, 1927.
4. Weber, F. P. Biliary chirrosis of the liver, with and without cholelithiasis. *Tr. Path. Soc.*, London, 1903, liv, 103–125; *Internat. Clin.*, 3: 57, 1903.

THE DIAGNOSIS AND TREATMENT OF PENETRATING ABDOMINAL WOUNDS*

H. B. EISBERG, M.D., F.A.C.S.

NEW YORK

IN the general practice of medicine penetrating wounds of the abdomen are not commonly encountered. Because of this, unfamiliarity with the train of early symptoms and signs often leads to missing the presence of hemorrhage and visceral injury. In the city hospitals where these cases are frequently met, the diagnosis is usually though not always made. Occasionally a patient with a penetrating wound of the abdomen is sent home by the admitting doctor after the protective administration of tetanus antitoxin. In these cases there are at the time no symptoms or signs of shock, visceral injury or hemorrhage. Twelve to twenty-four hours later, however, the patient is brought back in shock with late classical symptoms and signs. Then of course the diagnosis is easy but the prognosis bad.

The following cases are selected from the series herein reported and briefly abstracted as they illustrate certain factors concerning shock, hemorrhage and visceral injury.

CASE REPORTS

CASE I. I. S. Gangster, shot in abdomen; marked rigidity of abdomen, tenderness over bullet wound; pain, nausea and vomiting, moderate shock. Operation: abdominal findings, negative.

Classical symptoms and signs of visceral injury; negative abdomen.

CASE II. B. A. Gangster runs five blocks after assailant who stabbed him. Omentum protruding, replaced by admitting doctor. Exploratory operation, negative. Wound opened five days postoperative, after coughing spell. Three feet of bowel protruding, replaced in abdomen and wound sutured by interne at bedside.

Patient made a good recovery, with no symptoms or signs of shock.

CASE III. W. D. Thief, shot in chase. No preoperative shock. Slight abdominal pain, rigidity and tenderness. Operation revealed 18 perforations of small gut, one of rectum. Resection of small gut, end-to-end anastomosis, rest of perforations sutured.

Patient showed no symptoms or signs of shock and made a good recovery.

CASE IV. C. B. Alcoholic patient; stab wound of abdomen with loop of bowel protruding. Refused operation for twelve hours. No sign of shock; no complaints whatsoever. No physical signs except stab wound and protruding intestine. Resection, end-to-end anastomosis.

Patient made an uneventful recovery.

CASE V. M. C. Demented individual opens abdomen with penknife, hacks away five feet of bowel with the idea of making frankfurters. Patient arrived at the hospital with oral end of bowel protruding from abdomen and slight degree of shock. Operation: end-to-end anastomosis. Patient died within twelve hours from surgical shock.

This case illustrated severe trauma with very little reaction before operation.

CASE VI. J. D. Bystander, accidentally shot. Operation one and one-half hours after injury. Slight shock, abdominal pain, tenderness and rigidity. Operation. Five perforations of small gut, two omental perforations. Death within five days. Autopsy reveals a general peritonitis. No perforations overlooked.

The time factor was one and one-half hours from time of injury to operation.

CASE VII. H. C. Colored boy; accidentally shot. Sent home from hospital. No symptoms

* Read before College Clinical Society of New York University and Bellevue Hospital Medical College, May 2, 1927.

or signs of abdominal injury at this time. Sixteen hours later returned in moderate shock with classical symptoms and signs of hemorrhage. Operation. Abdomen full of blood, no visceral injury, great omentum perforated in two places. Bleeding vessels sutured. Death within four hours. Surgical shock and hemorrhage.

All cases of penetrating wounds, even without symptoms and signs, should be admitted to the hospital.

These cases show a more or less individual reaction to shock, hemorrhage and resistance to peritoneal irritation (the result of visceral injury), regardless of how soon the patient is operated upon after injury. The given prognosis must be guarded. The cases in which the outcome was apparently good preoperatively terminated fatally and vice versa. The same factors pertain postoperatively as well.

This presentation is based upon thirty-four personal cases admitted to Harlem Hospital between 1919 and 1926, and upon animal experimentation between 1920 and 1924.

All penetrating wounds of the abdomen should be considered urgent and admitted to the hospital. Those cases which are obviously bleeding or show signs of visceral injury require no comment.

Patients suffering from doubtful non-penetrating wounds or from questionable penetrating wounds should be urged to stay in the hospital. No symptoms or signs indicative of intra-abdominal injury or hemorrhage need be present to make this observation period necessary. If there is the slightest question of doubt, an exploratory operation is indicated. In this connection, Turberville[1] states: "All perforating wounds of the abdominal wall should be subjected to immediate laparotomy in order to determine if any visceral damage has been done, and in that event to repair it."

Winslow,[2] Schoenberg,[3] Silleck[4] and others all advocate exploratory laparotomy in penetrating wounds of the abdomen. The writer is in accord with this procedure and cannot make it forcible enough. To his mind a gunshot or stab wound of the abdomen is enough indication for operation without any other symptoms or signs unless it can be definitely proven to be other than penetrating. This holds true despite the condition of the patient, provided he is given the proper preoperative treatment for shock and hemorrhage.

No attempt will be made to review the classical symptoms and signs of shock, hemorrhage and visceral injury. Waiting for them to develop for the purpose of a positive diagnosis or allowing the patient to become exsanguinated or prostrated by a toxemia, the result of a beginning general peritonitis, however, are to be condemned. Only early symptoms and signs and laboratory aids in those questionable cases that are beyond reasonable doubt for exploration will be discussed.

In stab wounds often a very small skin incision is present, although underneath the surface the knife has been twisted, resulting in severe visceral injury. In gunshot wounds careful inspection of the area of abrasion and contusion of the bullet wound is of great importance, as it allows a differentiation between the wound of entrance and that of exit. The direction of the bullet with underlying visceral injury can likewise be determined tentatively.

A careful study of the bullet wound elsewhere is also of paramount importance. It is most significant to know whether a penetrating wound of the chest has perforated the diaphragm with abdominal complications and whether the direction of the bullet in wounds of the buttock, sacrum or peritoneal regions points to abdominal injury. A slight pain or tenderness in the abdomen should be sufficient indication for operation in these cases.

Where there are several wounds it is momentous to know how many of these are of entry and of exit. The point of entrance is usually smaller than the calibre of the bullet; this varies with the different parts of the body, depending upon the elasticity of the skin and sub-

cutaneous tissue. The point of exit is readily recognized in that it is more or less key-holed in shape in many instances and larger than the wound of entrance. Variations depend upon a deformed bullet, foreign bodies, bone, etc. The salient fact to remember, however, is that there is no area of abrasion or contusion at the edge of the wound.

If there is a single bullet wound of entrance and one of exit the course of the bullet and the possible injury to viscera can be readily diagnosed. The direction of the bullet at its surface entry can be determined with accuracy except for the subsequent deflection by osseous structures. This is of great value especially in those cases where there is no wound of exit. If the area of abrasion and contusion is concentric, it signifies that the bullet has taken a straight course and that the underlying viscera in this region are in all probabilities injured. If the area of abrasion and contusion is to the right of the edge of the wound it signifies that the missile has passed from right to left. The same applies to any other involved circumferential part.

Since the opposite side of the abrased and contused area is always undermined and this process in turn increases with the obliquity, the more superficial the bullet tract the larger the area of abrasion and contusion and the greater the undermining. This observation is very important in differentiating superficial, non-penetrating wounds of the abdomen, which cross the abdomen causing pain and at times nausea, vomiting, tenderness and rigidity.

The differentiation of shock, the result of injury, from shock, the result of hemorrhage, is most difficult at times. The former can be medically combatted, whereas the latter is an absolute indication for operation. Seeing of the actual amount of blood is most significant. In too many instances when reported it is fallacious, for the lay interpretation of quarts of blood might actually mean only one ounce. Furthermore, in penetrating wounds of the abdomen very little escapes externally. Therefore one must rely on the hemoglobin index, the total red and white counts and blood pressure readings. In those questionable cases where there are no clinical signs of intra-abdominal injury except shock which may or may not be the result of hemorrhage, an hourly blood pressure reading, hemoglobin index and red and white count become diagnostic. A polymorphonuclear-leucocytosis occurs in shock, the result of hemorrhage, within a few hours, even before there is an appreciable fall in the hemoglobin and red blood cells. This does not take place in shock alone. The systolic blood pressure does not fall in shock which is not the result of hemorrhage. The original reading may be very low in either surgical shock or shock due to hemorrhage, but in the latter where there is continued bleeding it continues to fall. The pulse rate after several hours of study is of value if the rate and quality have been observed during this time. An increase in rate and change in quality is indicative of hemorrhage or infection. None of these symptoms and signs mentioned, except the study of the stab or bullet wound itself, should be ordinarily employed for diagnosis except in rare instances where reasonable doubt exists as to whether an exploratory operation is indicated or not.

The following observations were made upon experimental penetrating wounds of the abdomen in animals under morphine-ether anesthesia in class demonstrations from the years 1920–1924 inclusive. The reason for perforation of the abdomen was to produce an experimental perforation (ulcer) of the stomach. Despite the site of election and the known anatomical position of the animal's stomach, in less than one-third of the cases was the organ perforated. Investigation showed that most of the animals had a markedly contracted stomach. Where the viscus was distended, the perforation was successful as a rule. The animal's stomach is very muscular and not as firmly fixed as in the human. The force of the instrument when passed through the abdominal wall likewise was a factor, as it could not be too

great for fear of injuring the large blood vessels and the parenchymatous organs in the upper abdomen.

An immediate exploratory laparotomy was performed. Peritonitis, the result of gastric or intestinal spill, was negligible. Most of the cases of peritonitis which followed could be traced to faulty closure of the perforation or outside contamination. Where the force of the driven instrument was too great, massive hemorrhage resulted owing to injury of the large blood vessels. The aorta, vena cava, superior mesenteric artery and large lacerations of the liver were responsible for this severe hemorrhage. In several instances, the hemorrhage was apparently controlled at the time of closure of the abdomen, but either a secondary hemorrhage resulted or primary hemostasis was not complete due to the protective mechanism of low blood pressure from the loss of blood which did not allow unligated vessels to bleed. Mesenteric hemorrhage was controlled by ligation and with resection of gut if the involved circulation to a given segment of gut was too great. The gastric perforations were closed by a double purse string suture, which was in turn covered by a piece of omentum held with one or two stay sutures. The intestinal perforations were closed by single simple purse string or a modified clock suture. Parenchymatous injuries of the liver and spleen were treated by mattress sutures or packing or both. In smaller injuries packing controlled the hemorrhage and was removed at the end of the operation. In cases where there was injury to the pancreas, the animal succumbed, the result of an acute pancreatitis.

It is obvious that the treatment of penetrating wounds of the abdomen occurring during civil practice cannot be properly compared to those that are encountered in military engagements. The conditions under which first aid treatment is administered as well as the transportation of the patient and the number of cases treated at a time are entirely different.

All cases of penetrating wounds of the abdomen should be operated upon as soon as the diagnosis is established. Infusion or transfusion can be administered if the abdomen is to be immediately opened in desperate cases. To wait for the patient to recover from physiological shock, which is a personal equation, does not justify the means of delaying early operation with stimulation despite hemorrhage. Intensive circulatory stimulation should not be carried out if the operation is not decided upon at once. Routine shock treatment is instituted even if the patient appears to be in good condition. Morphine can be administered with impunity. Needless to say all patients should be catherized if they have not voided.

Good assistance, including competent nursing, is essential. The operating technique should be perfect. Any type of injury should be antipicated. Sufficient threaded intestinal needles and laparotomy sponges should be on hand. A second operating team to administer infusion or transfusion should be in readiness for immediate call.

The incision is governed in part by the location and direction of the bullet or stab wound. A compromise incision, paramedially to the right or left, is made if the entire abdominal contents are to be rapidly inspected and palpated with immediate repair of the various lesions as they are revealed. Speed must never be so paramount as to cause the overlooking of a single perforation or bleeding point. Puttering with an individual perforation where there are ten or more, however, is contraindicated.

Immediate total evisceration, as recommended by Connors,[5] is indicated if it is evidenced that there are numerous perforations of the bowel or a hemorrhage which is not easily discernible. Numerous objections have been raised, the only one of consequence being the slight added shock of immediate total evisceration, which is not sufficient to condemn it. The other method of gently pulling out of the gut loop by loop and returning it in the same way probably produces as much shock, if not more. Furthermore, there is greater soiling and necessarily more handling of gut surface. Immediately after opening the abdominal cavity with evisceration, the intestinal perforations become extraperi-

toneal and further intraperitoneal soiling is avoided. The perforations are readily found and the large intestine can more easily be inspected. The root of the mesentery can be thoroughly examined as well as the remaining intra-abdominal viscera. In stab or bullet wounds where the pathology is localized and easily recognized, it is not employed.

Injury to a hollow viscus is most important of all and offers a different consideration than that of the solid viscus. In the former, infection and secondary hemorrhage are the prime factors, whereas in the latter, hemorrhage is the main consideration except in the case of pancreatic injury where an acute traumatic hemorrhagic pancreatitis may result. The omentum and mesenteric attachments of the gastrointestinal tract are considered as solid viscera in that the severity of the injury depends upon the hemorrhage, and secondarily upon the influence of the loss of circulation to an involved segment or loop of bowel.

In perforations of the stomach the significant fact to bear in mind is the through and through perforation. In all injuries to the stomach, one should be sure to open the lesser sac; failure to do this has terminated in more than one death, the result of an oversight of the posterior perforation of the stomach. Gastric perforations are best inverted by a double purse string suture or a double whip-over of the running Lembert type.

Intestinal perforations are closed by a double purse string suture. If they are numerous a single suture is all that is required. If many perforations are found within a small segment of bowel, resection with an end-to-end anastomosis is performed, as it saves time and also prevents the production of a subsequent acute mechanical intestinal obstruction.

Injury to the gall-bladder and its ducts or to the urinary bladder is a rather serious visceral involvement. In the former resection is indicated if the cystic duct is severed. If the common duct is injured below the cystic duct, the gall-bladder can be anastomosed to the stomach as this is a safer procedure than repair of the common duct, especially if there are numerous other visceral injuries. The technique of Barber[6] for common duct repair after injury is employed where indicated.

Perforations of the urinary bladder are closed by a double or a triple running Lembert suture and should always be followed by urethral or suprapubic drainage. This type of injury is frequently overlooked in gluteal, sacral or perineal wounds. Hence the importance of catheterization before operation.

Injury to the pancreas has a graver significance than that of any other solid viscera because of the possible development of a traumatic pancreatitis. The less trauma and manipulation of this organ the better. Slight packing with direct drainage offers the best form of treatment.

Liver injury is controlled by packing with washed iodoform gauze. The mattress suture with a non-cutting needle and plain catgut apparently has no advantage over packing. If a suture is employed, no unnecessary pulling should be used nor should great tension be laid upon the suture in tying it.

Injury to vessels of the hilus of the spleen or severe laceration of the parenchyma calls for resection. The organ can be removed with impunity, as reported by Connors[7] and others, so no time should be wasted in determining what to do.

Penetrating wounds of the kidney are best left alone, unless there is free hemorrhage from the perforation or laceration of vessels intraperitoneally. Massive packing is sufficient in most instances. Likewise retroperitoneal hemorrhage, if present, should not be tampered with; it is usually the result of kidney injury. Opening of the parietal peritoneum in the presence of blood clots make an ideal pabulum for bacteria and the much-sought for bleeding point, as a rule, is not found; hemorrhage is not controlled, and the avenue for infection is made possible. Massive packing

is the best method of controlling this type of hemorrhage if there is intraperitoneal bleeding. If the larger blood vessels are involved, a massive hemorrhage as a rule results and death occurs before it is controlled. The successful ligation or suture of the large injured vessel wall usually results fatally within a few days, either the result of thrombosis or the shutting off of the circulation to an organ.

Uterine injury is readily controlled by one or two mattress sutures. If it is a lone injury and the bullet is embedded in the uterine wall, hysterectomy may be performed, provided the patient's general condition is good. There should be no hesitancy in removing the spleen, kidney, ovary or tube if there is a severe injury or involvement of the circulation to any of these organs.

Resection of the omentum is indicated if the involved circulatory trauma is sufficient to result in gangrene by ligation of the bleeding vessels. Mesenteric injury is controlled by suture. Here one must be careful in determining the artery and vein involved and its proximity to the antemesenteric border of the bowel. Several vasa recta may be ligated with impunity. The second arcades offer the greatest factor of safety. If the arteria intestinalis or two vessels of the first arcade are injured, resection of the area of gut supplied by these vessels is the safer procedure.[8,9] In certain cases where the origin of intra-abdominal hemorrhage is not readily discernible after a search for a reasonable length of time, massive packing has been of value. A word may be said concerning the peritoneal toilet in cases where there is severe hemorrhage with numerous perforations of the bowel and other visceral injuries are present. Large blood clots are best removed manually. To visualize a bleeding point with free hemorrhage, numerous wet laparotomy pads and a suction apparatus are simultaneously employed. Too much time should not be wasted in peritonealization of raw areas. Indecisions with handling and rehandling of tissue are to be avoided. Normal saline solution can be left within the abdominal cavity for stimulation in cases of hemorrhage alone. Where intestinal perforations are present saline solution is contraindicated but has been used in many instances without untoward effects.

All cases should be drained except those in which exploration reveals a negative abdomen. A drain has never resulted in any great material harm to the patient. In cases of hemorrhage alone, where packing is used it acts as a drain. Here it is best to allow the packing to remain in situ for several days without removal; the early pulling out of the packing may result in secondary hemorrhage. After several days the irritation of the packing causes a serous exudate and allows a more easy removal. Further drainage is governed by the type of case. In the average case where there is severe visceral injury, a situ drain is employed with drainage of the various abdominal gutters. Always drain the lesser sac if it has been injured or opened.

In most cases a through and through closure of the abdomen rather than a layer closure is the method of choice, since the previous intra-abdominal work uses time and nothing is gained by a perfect closure. Secondary repair of an abdominal wound is preferable to a careful closure where the life of the patient is involved.

Postoperatively routine shock treatment is continued regardless of the condition of the patient. For the first twenty-four hours morphine can be freely administered. Paralytic ileus should be prepared for. Pituitrin in 1 c.c. doses is employed when indicated. Despite intestinal injury a rectal tube can be immediately employed and within eight to ten hours a low enema administered and continued every few hours if necessary. Gastric lavage can be employed within a few hours. In gastric injury lavage is a safe procedure after twenty-four hours. From the evidence at hand, gastric and intestinal perforations when sutured are sealed within eighteen hours to allow normal physiological con-

Chart I

Injury of Organs

Case number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	Total
Initials	H. L.	A. J.	S. J.	A. M.	V. M.	M. T.	B. A.	J. J.	H. S.	J. D.	M. L.	W. M.	J. T.	K. S.	B. N.	I. S.	F. P.	
Hours from injury to operation	10	12	14	3	4	2	4	3	3	1	1	1	7	6	3	7	4	
Exploratory operations	..	..	..	..	..	..	..	..	+	..	..	..	..	..	..	+	..	2
Perforations:																		
Liver	..	..	..	+	+	..	..	..	.	..	..	..	+	..	+	..	+	5
Kidney	+	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	+	2
Omentum	..	+	..	..	..	+	..	..	..	..	..	..	..	..	..	..	..	2
Mesentery	..	..	+	..	..	..	..	..	..	..	+[3]	..	..	..	..	..	..	2
Stomach																		
Small intestine	..	+[2]	..	+	..	..	..	..	..	+[5]	..	+[7]	..	+[2]	..	..	..	5
Large intestine	+[2]	..	+	+	..	..	..	..	..	+[2]	+	..	..	..	..	..	..	5
Appendix																		
Diaphragm	..	..	..	..	..	..	..	..	..	..	..	..	..	..	+	..	..	1
Lungs	..	..	..	..	..	..	..	..	..	..	..	..	..	..	+	..	..	1
Protrusions:																		
Omentum	..	..	..	..	..	..	+	+	..	..	..	..	..	..	+	..	..	3
Intestine	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	+	1
Hemorrhage:																		
Deep epigastric																		
Intraperitoneal	+	+	+	+	+	..	..	..	..	..	+	+	+	+	+	..	+	11
Retroperitoneal	+	..	+	..	..	..	..	..	..	..	..	..	..	..	..	..	+	3
Mortality:																		
Living	+	+	..	..	..	+	+	+	+	..	+	+	..	..	..	+	+	10
Dead	..	..	+	+	+	..	..	..	..	+	..	..	+	+	+	..	..	7

Case number	18	19	20	21	22	23	24	25	26	27	28	29	30	32	32	33	34	Total
Initials	M. C.	E. B.	D. E.	H. F.	J. R.	H. S.	W. D.	N. W.	B. B.	C. B.	C. W.	H. C.	M. S.	B. M.	M. B.	M. S.	G. B.	
Hours from injury to operation	3	2	1	1	4	3	2	4	8	12	4	18	4	6	2	3	2	
Exploratory operations	..	..	+	..	+	..	..	..	..	..	..	..	..	+	..	..	..	3
Perforations:																		
Liver	..	..	..	..	..	+	..	..	..	..	..	..	+	..	..	..	..	2
Kidney																		
Omentum	..	..	..	..	..	..	..	..	..	..	+	+[2*]	..	..	+[2]	+[2]	..	4
Mesentery	..	..	..	+	..	..	+[4]	+	..	..	..	..	..	..	..	..	..	3
Stomach	..	..	..	+	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Small intestine	+	..	..	..	..	..	+[15]	+[2]	+[6]	..	..	..	..	..	..	..	..	4
Large intestine	..	..	..	..	..	..	+	..	..	..	..	..	..	..	..	..	..	1
Appendix	..	..	+	..	..	..	..	..	..	..	..	..	..	..	..	..	..	1
Diaphragm	..	..	..	..	..	..	..	..	..	..	..	..	+	..	..	..	..	1
Lungs	..	..	..	..	..	..	..	..	..	..	..	..	+	..	..	..	..	2
Protrusions:																		
Omentum	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	+	..	1
Intestine	..	..	..	..	..	..	..	..	..	+	..	..	..	..	..	..	+	2
Hemorrhage:																		
Deep epigastric	..	..	..	..	..	..	..	..	..	..	..	..	..	..	+	+	..	2
Intraperitoneal	..	+	..	+	..	+	+	..	..	..	+	+	+	..	+	..	..	8
Retroperitoneal	..	+	..	+	..	+	..	..	..	..	..	..	..	..	..	..	..	3
Mortality:																		
Living	..	+	+	+	+	+	+	+	+	+	+	..	+	+	+	+	+	15
Dead	+	..	..	..	..	..	..	..	..	..	..	+	..	..	..	..	..	2

* Small numerical coefficient equals number of perforations in each case.

tractures. Fluids by mouth should be withheld for twenty-four hours if there is a gastric repair. Fluids are essential whether by infusion, transfusion or hypodermoclysis and should be freely administered.

ANALYSIS OF CASES

There were thirty-four cases of penetrating wounds of the abdomen in this series, sixteen of which were produced by a knife blade, the remaining being the result of a bullet. Operation was performed within an average of five hours from the time of injury. The earliest case was operated upon within one hour and the longest interval was eighteen hours.

CHART II

AUTOPSY FINDINGS

Case Number	Name	Hours from Injury to Operation	Complications	Autopsy*
3	S. J.	14	Paralytic ileus	General peritonitis
4	A. M.	3½	Paralytic ileus	General peritonitis
5	V. M.	4	Pneumonia Paralytic ileus	Pneumonia
10	J. D.	1	Paralytic ileus	General peritonitis
13	J. T.	7	Pneumonia	Pneumonia
14	K. S.	6	Paralytic ileus	General peritonitis
15	B. N.	3	Mediastinal flutter Pneumonia Empyema	Pneumonia Empyema Sub-phrenic abscess
18	M. C.	3	Surgical shock	Surgical shock
29	H. C.	18	Paralytic ileus	General peritonitis

* No perforations or bleeding points overlooked.

The symptoms and signs of intra-abdominal injury, hemorrhage and shock, alone and together, were present, indicating operation in all but five cases. In these cases an exploratory operation was nevertheless performed. Chart I illustrates the organs injured.

Fifteen cases made an uneventful recovery. Eight cases developed a paralytic ileus, three of which in addition were suffering from severe shock. There were six cases of marked shock; three of these were due to severe hemorrhage, while the fourth developed a hemothorax. In the remaining two there was no apparent reason for the degree of shock present. Postoperative pneumonia occurred in three cases, and one of these developed a hemothorax and a subphrenic abscess. An osteomyelitis of the sacrum occurred in one instance, the result of the wound of exit. Retention of urine was present in one case.

There were nine deaths in this series. Chart II gives a brief summary with autopsy findings of the cases that died.

BIBLIOGRAPHY

1. TURBERVILLE, J. S. A plea for promptness in making decisions in injuries about the abdomen. *Internat. J. M. & S.*, November, 1926.
2. WINSLOW, N. Penetrating abdominal wounds. *Surg., Gynec. & Obst.*, 34: 617, 1922.
3. SCHOENBERG, H. B. Subcutaneous visceral injuries. *New York M. J.*, 118: 500, 1923.
4. SILLECK, W. M. Penetrating wounds of the abdomen. AM. J. SURG., 37: 3, 1923.
5. CONNORS, J. F. Gunshot wound of the abdomen. *Surg. Clin. N. Am.*, 3: 563, 1923.
6. BARBER, W. H. Choledocho-enterostomy and postoperative dilatation of the bile-ducts. *Ann. Surg.*, 70: 531, 1919.
7. CONNORS, J. F. Ruptured spleens, spontaneous and subcutaneous. *Ann. Surg.*, 74: 1, 1921.
8. EISBERG, H. B. Intestinal arteries. *Anat. Record*, 28: 227, 1924.
9. EISBERG, H. B. On the viability of the intestine in intestinal obstruction. *Ann. Surg.*, 81, 926, 1925.

PRINCIPLES AND TECHNIQUE OF
CUNEIFORM OSTEOTOMY

F. M. CADENAT, M.D.

PARIS, FRANCE

IN France for a long time when one wanted to straighten a deformed limb (fracture healed in poor position, ankylosis in poor position, etc.) by a cuneiform osteotomy, it was considered sufficient to remove the bone with approximate exactness and to maintain the reduction by a plaster cast.

The first improvement on this method was to apply fluoroscopic control so that if the sections were not absolutely exact, the error could be corrected at the time of application of the cast. But in such cases there is the risk of leaving a dead space between the bony surfaces which retards the consolidation. This may not be of serious consequence in an infant whose skeletal system possesses considerable osteogenic power but in the adult the retardation of consolidation may end in a pseudoarthrosis.

The ideal is thus to make sections perfectly exact in such a manner that when the limb is reset in position the bony surfaces will be intimately in contact. It is necessary also that the sections give to the limb its proper direction, and not the contrary.

We have conceived a very simple apparatus which is set from the fluoroscopic shadows and permits one to make plane sections with geometric precision. This apparatus has been presented at several meetings.*

Before describing the apparatus it is necessary to show the principles upon which it rests.

MEASUREMENT OF BONY ANGLE

The size of the bony angle to be removed is given by the very angle of the deviation which is being corrected. The fact is evident, but if the reader has the slightest doubt he can easily convince himself by cutting out the accompanying diagrams (Fig. 1 to 5, B) on a sheet of paper. He will then find that to achieve the straightening of the limb, he may carry back from any point whatever on the bone, the angle ABC and place it perpendicularly or obliquely to itself at the point of angulation to be corrected, or at a distance from the latter. Practically, it is not without danger that this resection is done. For each given case there is an optimum resection which it is necessary to choose, as we shall see in a moment, but it is important to convince oneself that in all cases the straightening of the limb is obtained.

In order to obtain from the fluoroscopic plates the data giving the exact measurements of the angle ABC, it is necessary to take certain precautions which we shall now indicate.

FLUOROSCOPY

A plate is only the projection on a flat surface of a more or less deformed image. To reduce the deformation to a minimum, it is necessary to consider certain general and special principles:

1. Exact centering on the angulation and focusing on this point.
2. Removal of the tube as far as possible from the limb.
3. Application of the plate closely against the limb and in a plane perpendicular to the direction of the rays.

In this particular case it is important to note the following facts (Fig. 6): If the given angle is turned on one of its arms in the direction of the arrow, one obtains a position in which this angle is maximum, another at right angles to the preceding in which this angle disappears,

* Bulletin et Mémoires de la Société Nationale de Chirurgie (Paris, October 25, 1922), and Congrès de l'Association francaise de Chirurgie (Paris, Oct., 1924).

and a whole series of intermediate positions. The only plate which is of use is that in which the angle is maximum, for this is the only one which gives a true image. To be certain of obtaining this true angle of deviation it is enough to find on the screen the position in which the limb seems corrected, and then to place the roentgen-ray tube at a right angle (90°), the limb itself remaining immobile.

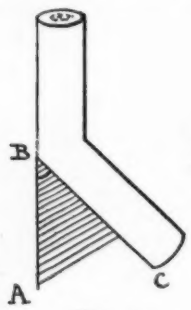


Fig. 1.

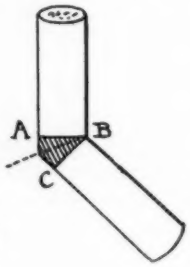


Fig. 2.

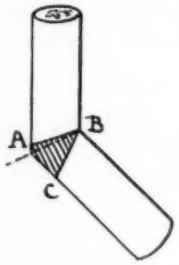


Fig. 3.

Fig. 1. The angle of deviation ABC measures the amount of cuneiform resection to be done. Cut out this angle on a piece of cardboard with a scissors; carry it to a point at the level of, or at a distance from, the angulation; resect the corner which it represents; the angle will always be corrected.

Fig. 2. The angle of resection is placed symmetrically over the angulation (bisection over bisection). Perpendicular sections.

Fig. 3. The angle is placed obliquely. Oblique sections.

UTILIZATION OF THE PLATES

It is not always simple to measure on the plate the angle of deviation, especially when one is concerned with a curved bone, as the bones in rickets. In the latter case, rather than take direction of the diphysis, it is better to be guided by the inter-articular lines. For example, in deformities of the femur and tibia, one traces the inter-articular planes of the knee and the tibiotarsal articulation, and constructs perpendiculars from them. What is really important is that the weight of the body falls perpendicularly to these inter-articular planes. For the femur it is also necessary to remember that between the anatomical axis of this bone (direction of the femoral diaphysis) and the mechanical axis (line going from the center of the femoral head to the middle of the knee) there is an angle of about 10° of which it is necessary to take account if one wishes to have the weight of the body fall in its proper axis.

When the angle of deviation (also angle of correction) has thus been determined, it is well to examine the plates to determine the best bone section to practice in the particular case. A certain number of factors may intervene here, for example, the quality of the bone, which may be found in the fluoroscope; the necessity of passing at a distance from a deformed area for fear of reactivating an osteomyelitis not fully extinguished; or the necessity of leaving the cartilage for growth, etc.

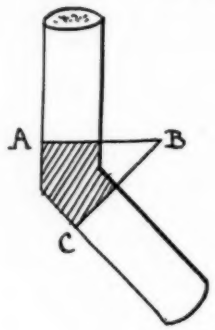


Fig. 4.

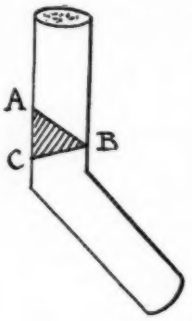


Fig. 5A.

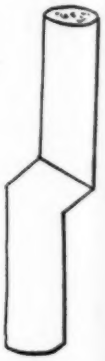


Fig. 5B.

Fig. 4. The angle faces the concave border of the bone from its apex. Trapezoidal resection.

Fig. 5A and B. The angle is placed above the angulation. Bayonet-deformity but with conservation of the correct position of the limb.

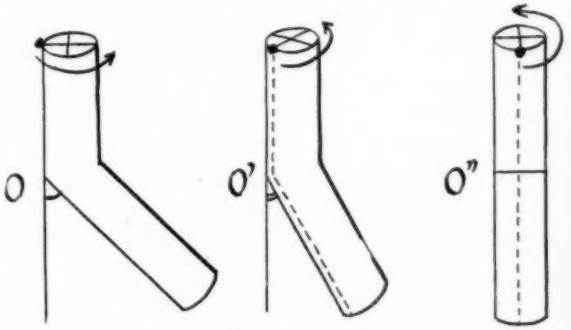


Fig. 6. Turn the angulated tube about one of its arms in the direction of the arrow.

At o the angle of deviation is maximum.

At o" (90° rotation) the angle is abolished.

At o' (intermediate position) the angle is smaller than at o. Only this maximum angle o is exact. It represents the true angle of deviation. It is obtained by looking for the maximum angle of deviation on the fluoroscopic screen, or more simply, by finding the position in which the limb seems in correct position (o") and by using the fluoroscope after moving the roentgen-ray tube 90°.

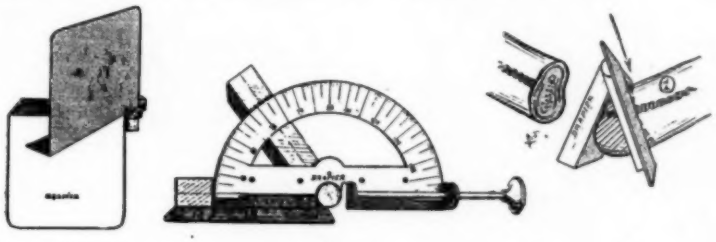
With regard to particular indications the following are of interest:

1. To carry the resection to the same level as the angulation, that is to say, to the spot where the two axes cross; in fact the further one is from this point, the greater is the bayonet-deformity (Fig. 5B).

2. To make the sections perpendicular to the bone to avoid slipping of the surfaces of the section. However, when one wishes to lengthen the limb by extension, oblique sections are especially indicated.

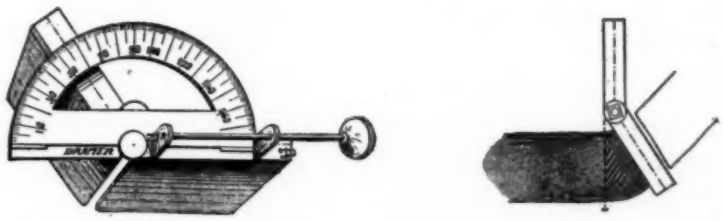
3. To place in contact surfaces of practically equal dimensions.

4. To do the minimal resection so as to obtain the minimum of shortening, unless the retraction of the tissues on the side of the concavity of the angulation demands a wider resection.



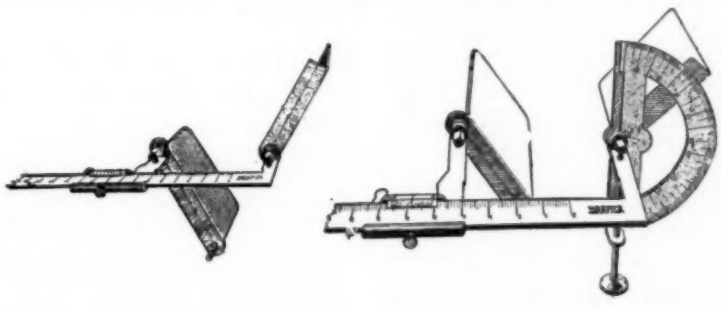
A B C

Fig. 7. Goniometer of Cadenat set for a lateral approach to the bone. A. The apparatus is made up of two jointed plates. B. Setting by means of a protractor on the fluoroscopic findings. C. Method of application. First section has been made approximately in the correct direction. One of the plates is applied in this bony section, the other plate guides the saw for the second section. The guiding line (1) is for the purpose of avoiding all slipping of the apparatus.



A B

Fig. 8. Goniometer set for an approach to the bone by way of the concavity of the angulation. A. The two plates are no longer jointed in the same manner as in the preceding figure. The protractor permits their being regulated B. Method of application. One of the plates is applied in the first bony section, the other directs the saw.



A B

Fig. 9. Goniometer regulated for an approach by way of the convexity (most common case). A. To permit more or less extended movement of the plates while preserving the angulation necessary for the resection, the plates are mounted on a track. B. Setting of the plates with a protractor.

In brief, and without entering into details, since the cases vary infinitely, it is necessary before operating to decide exactly what one wishes to do, to indicate one's landmarks thereby, and to establish one's plan of attack.

DESCRIPTION OF THE GONIOMETER

At the beginning of our researches we constructed complicated apparatus. We have finally simplified our goniometer in such a manner that it seems to us difficult to imagine a more schematic apparatus.

The primary section is made approximately in the correct direction. The instrument is placed in the sectioned bone

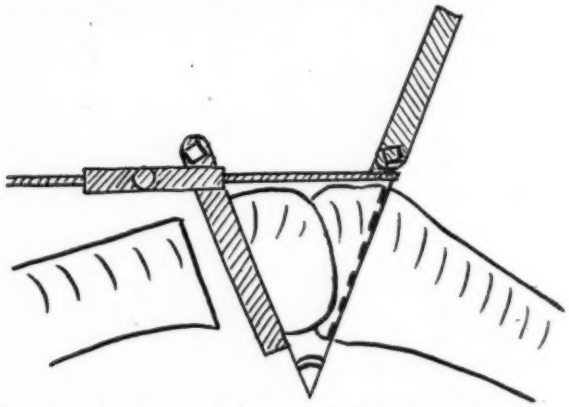


Fig. 9c. Application of the apparatus for a resection of the knee.

in such a manner that the second application of the saw is automatically made in the proper direction.

The apparatus, then, consists essentially of two solid plates, one of which is applied in the first bony section while the second forms a smooth plane on which the saw is applied to make the second section. The goniometer is set with the aid of a protractor from the findings of the fluoroscope. The instrument is modified according to whether one attacks the bone from the side of the convexity of the angle or whether one attempts the correction from the concave side. It may also be used for a lateral approach. One understands indeed that the anatomical arrangements, varying according to the region considered, do not permit approach to the bone except in a definite manner, and that an instrument of this type ought to be able to be modified to meet the different anatomical and anatomico-pathological needs.

When the angulation is attacked from its convexity the two plates are mounted on the two parts of a grooved track, which permits their movement, one from the other, with the maintenance all the time of their parallelism.

The figures which we reproduce (Figs. 7, 8, 9) give better than all description an understanding of the manner in which the apparatus should be applied. The only precaution to be taken, though paramount, is to avoid all slipping, that is to say, to operate on the patient in exactly the same

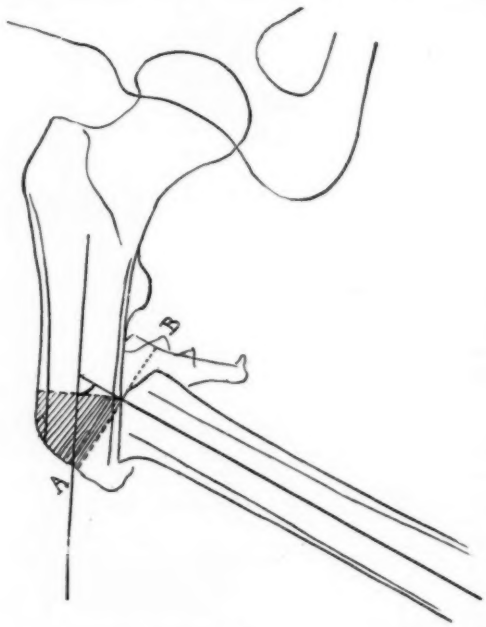


Fig. 10. Case 1. Gun-stock deformity of the right femur following a subtrochanteric fracture.

A. The angle of deviation measured as described is 62°. The shaded area shows the portion to be resected.

position as that in which fluoroscopy was taken to show the maximum angle of deviation (or in the plane exactly perpendicular), and to place on the bone before cutting it some landmarks which permit the avoidance in the course of the operation of all rotary movements of the apparatus.

Here will be given as examples three cases which give concrete verification of that of which we have just spoken.

CASE REPORTS

Case 1. Gun-stock deformity of the right femur following a subtrochanteric fracture.

The patient, sixty-five years of age, was seen five months after the accident with a very marked deformity (Figs. 10A, 10B). There was consolidation with the formation of osteophytes. Despite the age of the patient we decided to operate.

The angle of deviation was measured. The picture showed that the angle of deviation measured 62°. To reduce as much as possible the shortening we decided to make first of all a

distal section AB, and to do a reduced resection on the superior fragment, easily exteriorized through the wound.

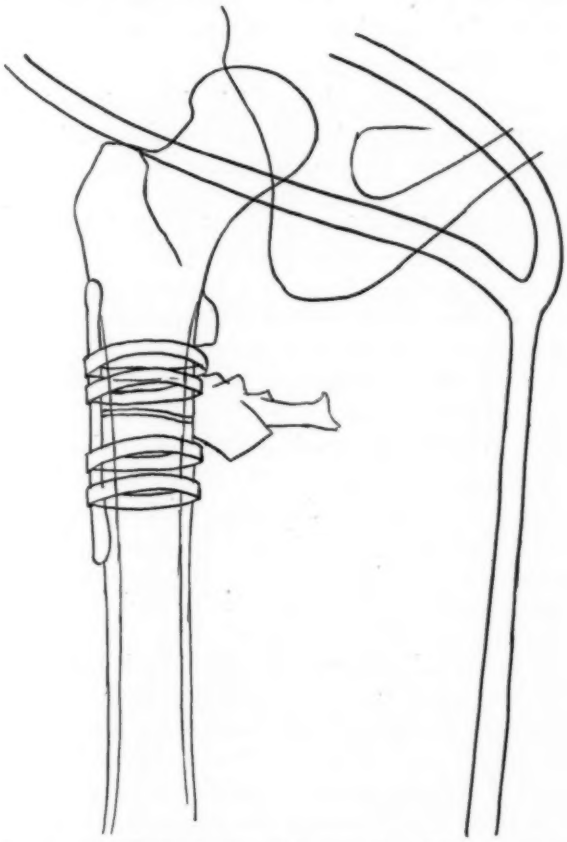
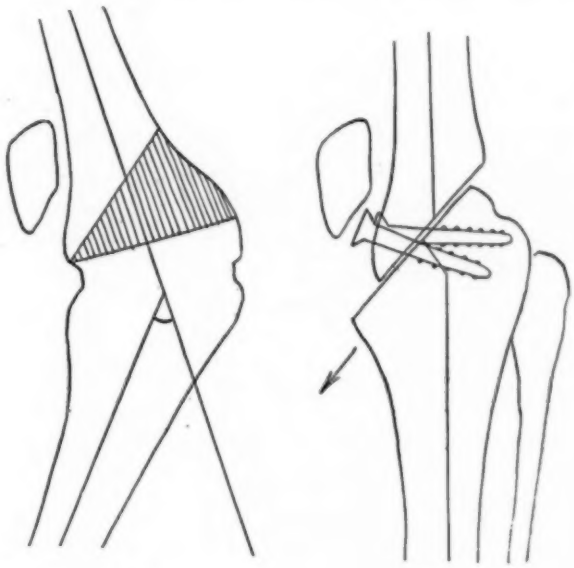


Fig. 10. B. The limb after this resection. The structure directed downward is made up of osteophytes.

Operation: Spinal anesthesia. Patient lying on the left side. External incision giving wide exposure of the region of the fracture which is liberated with a rugine. On the periosteum several marks are made with a bistoury at the site of the future sections, to avoid all error at the time of the second bony section. First section AB. The superior fragment is then exteriorized and the goniometer, previously set at 62° for an approach on the convexity of the angulation, is put in place. One of the plates is applied to the surface of the section, the other guides the saw. After ablation of the bony angle, the reduction is maintained by a Shermann plate supported by 2 to 4 Parhan sheets. Consolidation in two months.

Case II. Genu varum and curvature following osteomyelitis of the superior extremity of the right tibia (Figs. 11A, 11B).

Young girl of sixteen years. Numerous operations (6) for acute attacks of osteomyelitis, the origin of which dates from November, 1918. The last operation was done in April, 1920. I saw her on November 16, 1922, when the



A B

Fig. 11. Case II. Genu varum and curvature following osteomyelitis of the right tibia.

A. The angle is 40°. It was decided to pass above the angulation in order not to risk relighting the focus of inflammation.

B. After resection of the bony wedge the tibia is slipped forward in the direction of the arrow to diminish the shortening and to reduce the bayonet-deformity. Fixation by two screws.

infectious phenomena had been quiescent for two and one-half years. The deformity was very gross. With the thigh resting on the surface of the bed, the leg made an angle of 30° to 40° with the latter and the ankle was raised 11 cm. The valgus amounted to about 20°. The angulation was located in the region of the knee, 6 cm. below the patella. The bony ankylosis was complete.

Fluoroscopic examination permitted one to see in which position the limb seemed in correct place. A plate was taken at right angles by moving the roentgen-ray tube 90°, the limb remaining in place. The plate was placed on the internal aspect of the limb and kept practically vertical by resting it against a cubical block. The angle of deviation measured on this plate was 40°.

Operation, November 17. Ether anesthesia. U-incision, the inferior part of which goes down to three finger-breadths below the patella. Section of the patellar ligament and exposure of the femoral trochlea. Liberation of the femoral epiphysis. Landmarks made with tinc-

ture of iodine exactly in the middle of the anterior aspect of this epiphysis and in the corresponding aspect of the tibia. Section of the

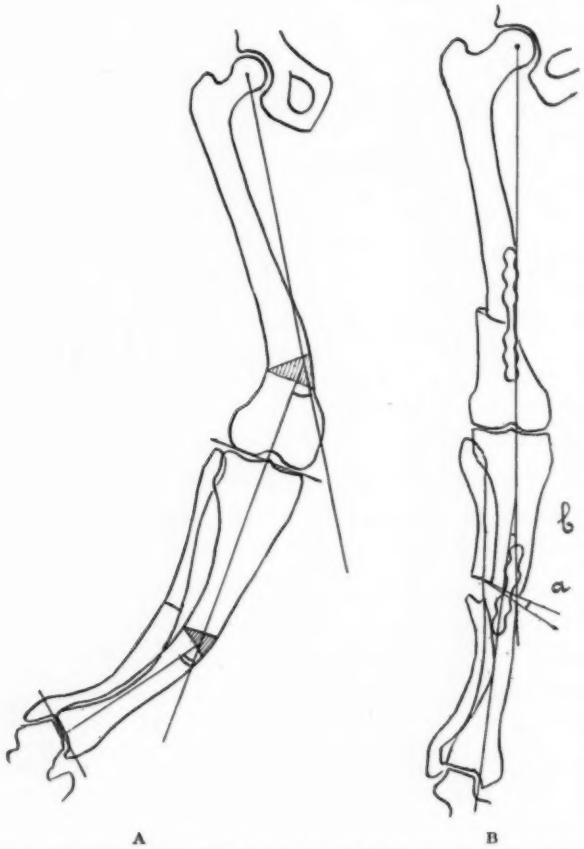


FIG. 12. Case III. Double rachitic deformity of the right femur and tibia.

A. To measure the dimensions of the resections to be practiced on the femur and on the tibia one is obliged, on account of being unable to use the axes of these curved bones, to be directed by the inter-articular lines of the knee and of the tibiotarsal articulation.

B. After the resection. One notes that a slight angulation persists due to the fact that the bony surfaces are not absolutely in contact. This angle (7°) is found at B, which demonstrates the accuracy of the section.

femur very obliquely from above and posteriorly. This obliquity is desired because we are seeking to correct to a certain extent the bayonet-deformity which results in a section done at a distance from the angulation. To avoid passing into the area of osteomyelitis the resection was done on the femur, that is, higher than the angulation. This resection was directed by the goniometer set for an approach by way of the concavity. The reduction was maintained by two wooden screws driven in from the front posteriorly into the femur and the tibia. Suture of the superficial tissues. Plaster cast.

We wish to point out with regard to this case, the difficulty of making oblique sections of geometric precision without a guiding apparatus.

CASE III. Double rachitic deformity of the right femur and tibia. The case under consideration is one of those deformities so frequent in rickets, and of which fluoroscopy gives an idea. The deformity being in the tibia and femur it is necessary to concentrate on these two bones. What is difficult in such a case on account of the curvature of the bones is to measure the dimensions of the resection to be done. The drawing (Fig. 12A) shows how to arrive at this by constructing the perpendiculars to the two inter-articular lines of the knee and the tibiotarsal articulation. For the axis of the femur one takes not the direction of the diaphysis itself, but the mechanical axis, the axis which passes through the center of the femoral head. It is in fact the only one which is of importance from the functional point of view. This patient was operated on by my friend and colleague, Dr. Mathieu, and the case has been presented to the Sociéte de Chirurgie de Paris. The first section (femoral) was of the simplest, but after the second section, made troublesome by the difficulty of exteriorizing the bone, we had the impression that the section had been too extensive. This impression can be explained by the curved form of the bone which one saw in the wound. Further, in bringing together the bones we did not try to obtain perfect coaptation of the bony surfaces. On fluoroscopic study after the operation (Fig. 12B), we found that in reality the section had been excellent. We could see at the same time that the angle which still remained between the surfaces of the tibial sections was exactly the same as that of the slight deviation (7°) of the inferior portion of the tibia on the general axis of the limb. If then, instead of trusting to the false impression which we had had, we had applied the two bony surfaces exactly against each other, we would have had a perfect correction. As it was, the result, despite everything, was very satisfactory.

In this error, slight as it was, we have the proof that in cuneiform osteotomy sections should be made not on impressions more or less exact, but on the exact geometric findings of an instrument. We think that the goniometer which we have just described gives complete satisfaction.

SOME INTERESTING BONE LESIONS*

A. E. GALLANT, M.D.

LOS ANGELES

IN 1877 Sir James Paget described a bone lesion to which he gave the name of ostitis deformans. Strange to relate, very little knowledge as to the etiology has been added during the fifty years which have elapsed since his original description.

The causation of this deforming bone condition has been ascribed to heredity, syphilis, bacterial invasion, disturbances of the endocrine system and neuropathic causes. Lately one writer reported several cases, attempting to show a congenital origin of this condition.

In contrast to Paget's disease, there is another obscure condition which bears the name of osteitis fibrosa cystica, described by Von Recklinghausen in 1891. There are some points of similarity in these two conditions because of the deformities which follow the onset of either Paget's or Von Recklinghausen's disease. A differentiating factor, however, is that ostitis deformans is essentially a condition of middle and later life, whereas the majority of cases of Von Recklinghausen's lesion are those of youth and early adult life. In both instances the onset of these conditions is insidious and in many cases make rather extensive progress before being discovered. Paget's disease affects both sexes but the majority of cases which the writer has seen have occurred in males, having seen only one case in the female sex. The cases of fibrocystic disease observed by the writer have been seen only in females, although males are subject to this condition also. In Paget's disease, the tibia is most often affected, generally unilaterally. In those cases where the pelvis and vertebral structures have been affected, there was only one instance involving the tibia. According to the majority of observers, the cranial bones become thickened, sometimes to two or three times their normal thickness, but only in one case seen at the Los Angeles General Hospital several years ago have I personally observed this cranial bony thickening. In Paget's disease, the ordinary clinical picture is that of an anterolateral bowing of the tibia with a shortening of the leg; consequently the patient walks with a limp on the side affected. It is said that trauma plays a part in this condition but I feel that it serves only to bring about a discovery of the condition rather than the causation. A detailed description of the pathology found in the long bones is not necessary, except to state that the bone physiology has gone rampant and that there is an erratic osteogenesis and an osteoclasis going on at the same time, and the characteristic roentgenogram findings show a linen mesh network effect in the bony structure. In every case of Paget's which the writer has observed, this peculiar striation resembling linen mesh both horizontally and vertically was present.

In those cases wherein the tibia was affected, there was generally a slightly increased surface temperature of the skin over the affected area, as compared to the normal on the opposite side. What value this has I have not yet been able to conclude. As has been stated, Paget's is definitely a disease of middle life, although one case has been seen which simulated Paget's in a boy of about seventeen years of age. Fracture is not uncommon in Paget's disease and this fracture can be brought about by very minor causes. One of my patients was walking along the street when his leg collapsed under him. Owing to the fact that the disease was so extensive in the tibia, and since even with the certainty of repair at the

* Read before Los Angeles Surgical Society, January 13, 1928.

site of the fracture he would still have a disability, amputation was thought to be the best procedure. This would allow the use of an artificial leg and possibly a more satisfactory gait than had been his custom.

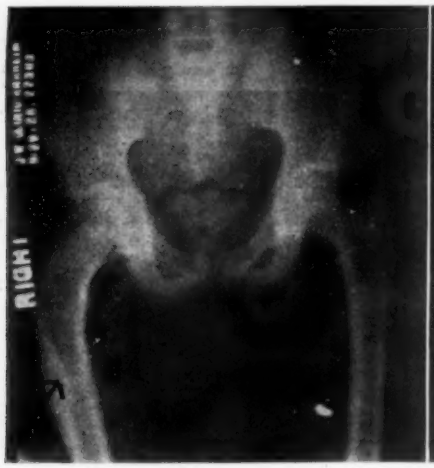


Fig. 1.

Fig. 2.

Fig. 1. Involvement right femur. Arrow points to small area in femoral shaft, suggestive of early bone cyst.
Fig. 2. Well developed case of osteitis fibrosa cystica, right femur. Note the marked deformity of the femoral neck and shaft.

The diagnosis in Paget's is not difficult. Generally the disease is well advanced when seen. The age of onset is generally after middle life, and the chronicity of the condition and the roentgenogram characteristics as described, make diagnosis easy.

The other type of bone lesion which is of interest is that of Von Recklinghausen disease, or osteofibrosa cystica, also known as metaplastic malacia and hemorrhagic osteomyelitis. One of these cases, the first

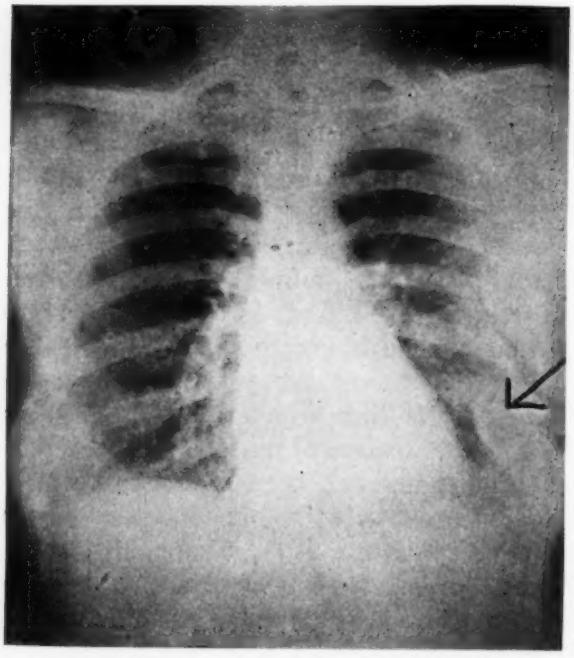


Fig. 3. Cyst at arrow point on seventh left rib.

Fig. 4. Lateral of both tibiae and fibulae showing marked changes in the right tibia and fibula.

of this type to be shown, was in a child about nine years of age who complained of a pain in the left femur and in whom the twenty-three years of age, and had a very marked deformity of both femora. Investigation as to the onset revealed the fact

Fig. 5. Pelvis and both femora showing the condition of the femoral necks three years after operation. Note the area of osteotomy in the left at arrow point in contrast to arrow point on right where osteotomies had been done and the condition of the femoral necks with the fairly normal left femoral neck as compared to the coxa-vara effect on the right side. The operator had done the osteotomy through the cystic region on the left and below the cystic region on the right. Note also marked deformity of pelvis.

Fig. 6. Multiple cartilaginous exostoses, involving both knee joints.

roentgen-ray findings revealed a peculiar density of the femoral shaft in its upper third, with a very indefinitely circumscribed area suggestive of bone destruction. (Fig. 1.) Roentgenograms taken about two months later showed a progress of the condition and it was decided that this was a very early form of fibrocystic disease. In comparing the roentgenograms in this case with a known case of fibrocystic disease which had been proven by biopsy specimen, I believe that in the first instance we were dealing with the fibrocystic bone condition.

In Von Recklinghausen's disease there are two distinct types of lesion, the solitary bone cyst and multiple cystic involvement of the long bones. The solitary bone cyst is not uncommon but generalized fibrocystic disease is rather unusual.

The writer has had one case under observation during the past ten years. When first seen the patient was about that the patient had on four different occasions fractured both femora, the cause of these fractures being practically the same in every instance, a slight fall with resulting disability. The last fracture which this individual suffered was in the left femoral shaft, and occurred in 1915, at which time the roentgenograms revealed a bone cyst at the site of the injury. The cystic condition was not recognized, and it is quite probable that other fractures had taken place at the site of cysts and had healed with satisfactory repair. The writer first saw this patient in 1918, at which time roentgenograms were made of all long bones with the result that there were found many cysts affecting femora, tibiae and fibulae, less marked in the left tibia and fibula and right humerus. Owing to the fact that the deformity in the femoral shaft, particularly in the region of the neck and trochanters, was slowly progressing, it was deemed best to observe

this patient until the ultimate amount of deformity had taken place, and then correct the same. There was no history of

Fig. 7. Multiple cartilaginous exostoses, involving both ankle joints.

any specific disease or inflammatory condition; the family history was negative in relation to this particular lesion. Urine was normal and the blood picture gave no indication as to the nature of the problem, and there was no suggestion in the literature whereby the process could be stopped.

As was stated, the patient was observed for about five years and then correction of the deformities was attempted. The right leg was corrected first by doing a cuneiform osteotomy on the right femur below the site of the cyst at the trochanteric region. Seven weeks later the second osteotomy of the same type was done on the left leg, and this time a large area of the cyst was removed. In both osteotomies the femoral shafts were fractured so as to permit of wide abduction. Before operative procedures the patient could not abduct either leg more than 10° and walking was difficult because of interference at the knee joints. The surgery and subsequent recovery were unattended by any unusual results. It is now about five years since these osteotomies and the patient is able to get about with her work. There is still some pain in the femora and the right tibia due to the fact that the process is more or less active.

Another interesting case which involved many of the long bones recently presented itself. The man who first saw this patient was misled as to the true nature of his condition. For years the patient had some difficulty in the hip joints but had not been told what the condition was. About ten days before the writer saw him, he had developed pain in the right hip and when seen was sent to St. Vincent's Hospital for observation. The structural examination showed bone-like projections at the lower internal aspects of both femora. Provisional diagnosis of exostoses of the adductor tubercles was made. The roentgen-ray findings revealed that the proximal and distal ends of both femora and the distal ends of both tibiae and fibulae were involved. (Figs. 6 and 7). At first glance the roentgen-ray findings of the hip joints would suggest a possible malignancy or cystic bone disease, although certain characteristics were lacking. Roentgenogram findings at the distal ends of both femora showed the condition of the bony structure to be that of multiple cartilaginous exostoses which as a rule cause very little difficulty other than interference with joint motion. The cause of the painful right hip proved to be due to a prostatic abscess, which when properly treated caused the disability in the hip joint to disappear. Males are more often affected than females. This condition has been reported quite frequently by German observers. The etiology is not known, but like other obscure bone conditions, syphilis and endocrine disturbances have been blamed for its occurrence, but these ideas have not been proven.

The last of this interesting group of lesions is rather rare, and occurred in a

man seventy-five years of age, who had led a very active life. About a year prior to having been observed by the writer, he had developed a painful back, in the region of the first and second lumbar vertebrae. Physical examination showed a slight kyphosis involving the first and second lumbar vertebrae. There was a marked rigidity of the spinal column in this region, suggestive of a tuberculous spondylitis, which is possible even at this age. From roentgenogram observations, diagnoses of syphilis, malignancy, tuberculosis, giant-cell tumor, Kuemmell's disease and primary sarcoma had been made. Myeloma had been thought of but no Bence-Jones proteins were found in the urine. This last condition, however, is not constant in the urinary findings, and for that reason we were somewhat misled. The patient eventually died of pneumonia and came to autopsy. The lesion of the spinal column proved to be a primary myeloma involving the second lumbar vertebra and some of the soft tissues in that region.

SUPRAVESICAL HEMATURIA DUE TO RENAL INFARCTION*

Paul W. Aschner, M.D.

NEW YORK

THE patient was a woman about forty-two years of age whose presenting symptom was pain in the back followed by hematuria on several occasions. When first seen she was bleeding and the cystoscope when introduced showed blood coming from the right ureter at all levels. Dr. Dourmashkin, who saw the patient two or three weeks before I did, also found right renal hematuria. The function on this side was practically unchanged. She had a systolic blood pressure of 150; there was no discernible cardiac lesion, and no atherosclerosis in the peripheral vascular system. A pyelographic examination of the right kidney showed some dilatation of the ureter and the peculiar elongation of the calices which we not infrequently see in patients with ptosis. A middle minor calyx had a filling defect.

A month later another examination was made, for we were in doubt as to a tumor in one of the calices. This picture was the same.

Another pyelogram made still a month later showed a wedge-shaped defect in the kidney convexity at a point corresponding to the defective calyx. Uncertain as to the lesion, it was thought better to explore the kidney. At operation the capsule was found to be lifted away from the organ by blood at the middle of its convexity, and there was a large anemic infarct beneath this. The kidney was decapsulated, and examination of a specimen excised from the lesion showed a typical infarct of the kidney.

Incidentally, after this procedure the patient had a secondary hemorrhage which required packing. She made a good recovery.

I assumed that we were dealing with a local lesion of one of the branches of the renal artery in the kidney. Ordinarily we see renal infarctions as more acute things than this, and, strangely enough, they are rarely accompanied by a gross hematuria. We are more apt to have a few red blood cells in the urine and marked albuminuria, which is more characteristic.

She came in again a year and a half later with a very large hematuria. When cystoscoped in the out-patient department, the ureters were catheterized and the urine from the kidneys was clear. Subsequently I found on the anterior bladder wall a small white lesion, about the size of a ten cent piece, with some exudate, looking like a patch of leucoplakia. A biopsy was made and it suggested a squamous cell carcinoma. We operated on the basis of this diagnosis. At the time of operation I could feel nothing through the bladder wall. On opening the bladder, I found the lesion and resected widely. It proved to be a very small squamous cell carcinoma on the basis of leucoplakia. Unfortunately the patient developed a gangrenous cystitis, ascending infection, and died. At autopsy, the scar of the old infarct was found in the right kidney.

*Case report, read before Section of Genito-Urinary Surgery, New York Academy of Medicine, Jan. 18, 1928.

FUNCTIONAL RESTORATION AS AN ELEMENT IN FACIAL REPAIR*

J. EASTMAN SHEEHAN, M.D., F.A.C.S.

NEW YORK

PERHAPS one ought to apologize for reminding a gathering of surgeons that consideration is to be given to function in any case of surgical intervention. There is some excuse for doing so, however. There is a steadily increasing literature about repairs of various kinds effected in the area of highest visibility and I suppose all of us, when we glance at such articles, at once make the comparison between the first and the last photograph with little more in mind than the degree of betterment in appearance that has been attained. Gradually we come to think that the esthetic improvement is the whole object of the procedure, so that if we go on long enough we are apt to fall into serious error as to the quality of the surgery that is demanded, the same error into which the general public is misled by reckless publicity and also by the actual methods of some enterprising people whose practise is very little concerned either with function or with the nature of the tissues with which they have to deal.

The truth is, of course, that function and appearance are very closely allied. One may say that as a rule failure of function is caused by some disfigurement or itself produces disfigurement. And the converse is equally significant; restoration of function conduces to esthetic improvement, and may even, in extreme cases, go far to compensate the patient for such degree of disfigurement as may remain after all possible has been done.

This leads to another consideration. It is axiomatic that any condition of the kind we have here in mind is to be diagnosed in terms of the loss, whether that loss affects tissues or function. But there is more. There may be loss that is intangible without being on that account any less real. Facial disfigurement may carry with it loss of the means to make a living, not because the capacity has been lost but because there is an unwillingness to afford to the victim the opportunity to work under the view of others. He may be capable of service but he is ineligible for employment. Or again, the person so disfigured may be so self-conscious as to shrink from all normal social contacts, or may be shunned by those whose society would be agreeable. Loss of the prospects of marriage, which is no small matter in some personalities, may be occasioned by what, from the surgeon's viewpoint, might be considered a very minor disfigurement. The face brings into the problem the relation of the individual to society, and while that is not commonly thought of as being within the range of surgical concern, actually it is.

Evidently, therefore, everything within the arsenal of reparative surgery is to be drawn upon, according to the need, with a view primarily to the restoration of function. The resulting stimulus to ingenuity is one of the things that imports an element of fascinating interest into the handling of every case of this nature.

Let me indicate the variety of these expedients by citing a few instances.

Customarily, we think of blockage of the airways as the only interference with function in relation to the outer nose, and in the same way we think of the septum as the seat of the dysfunction. But there are certain distortions of the columella which materially impede inspiration, and anything that lessens the flexibility of the muscles about the nostrils also constitutes a serious impediment. Traumatic injury

* Read before Section of Surgery, New York Academy of Medicine, February 3, 1928.

frequently so flattens the nasal bones that there must be an alteration in the nature of the posterior channels. As one studies the variety of injuries resulting from a heavy blow on the nose, he comes to see that the best expectation of restoring normal function, not merely the partial function associated with the passages nearest the septum, is to be realized by restoring all the elements of the outer nose as nearly as possible to the normal positions. So there is an advantage in separating the nasal bones at the maxillae and raising them to the old level, as also in reducing the size of the hypertrophied lower lateral cartilages. It is a fortuitous coincidence that the excised morsels of the alar cartilage serve very nicely to prolong the new line of the dorsum established in the upper quadrant by raising and realigning the nasal bones. There is undoubted satisfaction in observing the gradual reconstitution of the nose as the septum, columella and tip are restored by simple expedients, but there is still greater satisfaction in knowing that the better the nose looks after these readjustments the better is the functional restoration also.

Or suppose we consider the conditions in the orbit from which, in whatever manner, the eye has been removed. In the normal state, the eyelids are insured freedom of action by the flexibility of the conjuctival membranes. Destruction of these results in adhesion between the elements within and without the orbit, and so long as that condition persists there cannot be even a semblance of function as regards the lids. But once an epidermic graft, properly cut and properly placed, has been substituted for the conjuctival sac, the lids can be made to regain their mobility. If the nerves of the lids have been conserved, as very often they can be, the lids, after any number of devices for repair have been completed, may function almost as well over a prosthesis as they did over the eye itself. That account may sound like a commonplace of the clinic, but for the patient there is the additional interest that he is no longer refused employment because of his repulsive appearance.

In the region of the orbit there are two conditions nowadays encountered with rather disturbing frequency. One is the typical windshield wound, the other the typical knife wound as developed by the antagonisms of certain city groups with the old world traditions. In both instances vertical incision of the strands of the orbicularis muscle conduces to lagophthalmus as well as producing disfigurement. A very delicate plastic procedure indeed is is the regrouping of the muscle strands across these wounds, but once that is done and the skin cover is returned both the functional and the esthetic restoration has been achieved.

Perhaps it may be interesting to note other instances in which the desire to at least simulate function has led to some manipulation of muscle elements. One patient had suffered loss of all the tissues from and including the angle of the mouth to well outward toward the ear. We succeeded in covering that defect by a double skin flap, one for lining and the other for cover. Joining the lips in that way left much to be desired from the viewpoint of mouth function. This was partly remedied by manipulation of the muscles of the upper and lower lip, giving a pretty fair balance at that buccal angle for the action of the muscles constituting the orbicularis oris at the other angle. Unlike the orbital orbicularis, which is an independent muscle, the orbicularis oris is largely made up of the terminal strands of other muscles, so that by utilizing these other muscles its mechanism can be rather closely simulated. In the case mentioned, this principle was extended a little further; strands of muscle were carried down between the inner and the outer skin of the face cover, conferring some resiliency upon that part.

In another of these cases, involving this time almost the whole of one side of the face, the skin cover was given support by

insertion of bands of fascia which, being attached superiorly to the temporal muscle, not only served as a stay to the inert skin tissues but also, as the action of the muscle influenced the fascia, effectively simulated muscle movement on the cheek.

Another very interesting application of the tensile and resilient properties of fascia is in relation to the correction of some of the consequences of unilateral paralysis of the facial nerve. Since the live muscles on one side of the mouth are deprived of the normal antagonisms by which symmetry is established and maintained, distortion follows with some degree of dysfunction. What is required is to replace the antagonism, and this can be done with considerable effectiveness by means of fascia bands carried to locations near the mouth and then drawn up and anchored in the tissues forward of the ear. It is the restoration of something like a functional balance that underlies the esthetic correction in these cases.

In most of these instances, concern for function is to a greater or less degree incidental. But where, for example, the state of the tissues has produced intractable or even permanent trismus, restoration of function becomes the first of all concerns. The condition is produced by scarred and contracted membrane oftener than might be thought, and the flexibility of the membrane is impaired, it is useful to note, not only by disease but often by the devitalizing effects of the ray or radium treatments by which it is sought to check the disease. One finds, for example, after many such treatments of an angioma that all the tissues about the growth have been rendered incapable of functioning, only the tumor itself remaining indifferent to the repeated attacks. Extirpation of the tumor is necessarily accompanied by excision of all the useless membrane and its replacement, after release of the trismus, by some material which will not act to again immobilise the jaw. This is another of the many emergencies in which recourse may be had with all confidence to the epidermic graft. In practice there is no area too large for it to cover and there is almost no surface on which it will not "take." Sometimes it may be necessary to keep it on stretch for a time to obviate the possibility of shrinking and the effects of shrinking that can be foreseen, but the time is well spent.

It is hardly necessary to enlarge upon the interference with function that is involved in the presence of contractile scar, whether produced by burns or by other injuries. Obviously it limits by its presence the functional action of the tissues it overlays, and that action can only be restored when the tissues are given a covering under which they can freely move. Here we enter the field of skin grafts in general, epidermic, free full-thickness, tubed pedicle and all the other variants. It is a field where experience and skill are demanded, and where the esthetics of the end result are of almost paramount importance. The patient, whose face is to be exposed to the merciless gaze of society, is entitled to the best that can be done for him.

We may leave that phase of the subject with only the remark that unless due regard is had for function, the esthetic betterment will not materialize or will not be permanent, whereas if function is safeguarded improvement of appearance is vastly facilitated.

And may I conclude by suggesting that practitioners of one and another branch of physiotherapy might do well to give a little more thought than perhaps some of them do give to the probable consequences of devitalizing the tissues with which they have to deal? With the consequences of disease and accident we must expect always to have to deal, but there is surely a momentous significance in the fact that plastic or reconstructive surgery now has to cope with a great variety of dysfunctions and disfigurements that originate in this field of therapeutics.

PREOPERATIVE AND POSTOPERATIVE METHODS

WITH RECOMMENDATION OF ERGOT

WILLIAM LEE SECOR, M.D., F.A.C.S.

KERRVILLE ON THE GUADALUPE, TEXAS

IN a recent number of *The Lancet** appeared an article from the pen of that great leader among the master surgeons of the world, Sir Berkley Moynihan, entitled "Before and After Operation."

In this article Moynihan made the following statments:

"Present-day surgical technique is such that it can hardly be improved upon, but improvement is still to be looked for in methods."

"First, we should teach the sick to seek medical advice earlier in order that treatment may be given before the condition becomes incurable and in order that needless suffering may be prevented. . . . The laity must be taught to seek treatment for conditions which they have long regarded as trivial or have ignored."

We all, even the laity, now recognize the importance of early treatment in malignancy or cases with suspicion of malignancy, but there is much improvement to be made in the management of many other conditions. In appendicitis, for example, what a world of difference there may be in suffering, mortality, morbidity, loss of time and expense between an acute appendix removed quickly and without trauma while all of the disease is confined to the appendix and the one that has been carefully watched and mistreated with ice and purges for two or three days.

The hypertrophied prostate removed before back pressure has damaged the kidneys, before catheterization has caused infection, before a good surgical risk has been converted into a questionable one, serves as another excellent example of the great advantage of early surgical treatment. Additional examples are found in cholecystostomy or cholecystectomy before stones perforate, before one becomes lodged in the common duct with the much greater probability of postoperative crippling; removal of kidney stones before they contribute to "surgical kidney"; surgical treatment of goiter before the heart and the nervous system become permanently damaged.

These are only a few of the many conditions that are commonly treated and watched and mistreated until when they do come to the surgeon perfect end results are impossible.

The laity should be educated as Dr. Moynihan says but the burden of this instruction will and must fall upon the general practitioner, the family physician, who is not a thing of the past by any means, but to whom most of the intelligent laity still look for counsel and advice in things medical.

We quote again from Dr. Moynihan's article:

"Secondly, we should make greater efforts to improve the chances of the patient before operation and to help him after operation. Before surgical operation is undertaken we should be sure that mechanical treatment is necessary and more advisable than medical treatment; that the patient is in the best possible physical and mental condition to undergo an operation; that the procedure employed is the best procedure for the condition found, and that proper postoperative care will be given."

* Moynihan, B. Before and after operation. *Lancet*, 2; 789, 1926.

It is a fact that all too often patients are rushed into operation without a careful, painstaking study of their whole condition, a study that might show an indication for some preoperative treatment that would make the patient a little better surgical risk and insure a smoother convalescence.

I am of the opinion that the mind plays a larger part than is generally believed in securing a smooth anesthesia and prompt convalescence. We know that mental agitation, especially fear, suppresses the pituitary output, lessening tone of unstriped muscle fibers, permitting distention of the bowel which increases absorption of toxins from the lumen of the gut and in general giving a stormy convalescence.

Physiotherapy is of the very greatest value in preparing our questionable risks, both mentally and physically, for the ordeal of operation. It is of no less value in assisting a rapid, comfortable and complete convalescence.

I have for more than twenty years made regular use of hydrotherapy, electrotherapy heliotherapy and massage in my preoperative work so that my statements are based upon actual demonstration.

About two years ago my attention was called by Dr. I. Mayhugh to the possibility of ergot as a valuable addition to the armentarium of the surgeon. I had of course used ergot in obstetrics, in some gynecological cases and in some few medical cases, but as an agent to use as a routine before operation to improve the patient as a risk and after the operation to smooth out convalescence, ergot was new to me.

I studied the available literature on the drug and gained enough confidence in it to start a series of 200 major operations in which a dose of ergot was given as the patient went on the table, repeated when the patient was returned to bed, and then given during the postoperative period as conditions indicated.

I used in this series ergotin, ergotol and subculoyd ergot. The latter became our choice for routine use.

In 1904 Dr. A. T. Livingston published an article* in which he wrote very enthusiastically of his results in the use of ergot in general surgery.

S. J. Meltzer and J. Auer did some experimental work in 1906–1907 and concluded that ergot increases the spontaneous movements of the stomach and intestines and augments the motor effect of the vagus. Moderate doses increased the frequency and energy of the normal movements; large doses had a tendency to produce tetanic and less rhythmic effects.

The peristaltic augmentation was manifest in both small intestine and colon and not infrequently even in the otherwise inert cecum.

The vagus nerves were stimulated within the thorax in their course upon the lower part of the esophagus. It seems certain that ergotoxine increases the motor responsiveness of all parts of the gut to stimulation of the nerves.

Ergot in full dose has a very pleasing effect upon the unstriped muscle fiber, imparting tone where it is lacking, improving the circulation of the blood and equalizing vascular tension. A dose of 1 c.c. given deep into the muscular tissue just before the anesthetic is started seems to have distinct value in combating shock and assuring a smooth anesthesia.

Atropin will completely abolish the vagus effect upon the stomach and greatly reduces its effect upon the intestines. Even after ergot has been given atropin may abolish spontaneous movements of stomach and intestines.

Our work has led us to believe that possibly the use of atropin with the morphine in the preliminary hypodermic, so universally used, may have some effect in allowing postoperative dilitation of the stomach and intestines. We have therefore discontinued the use of atropin with mor-

* Livingston, A. T. Ergot in alcoholism, morphinism, and the general class of drug habit cases. *N. Y State J. M.*, 4: 28, 1904.

phine and now use morphine ¼ gr. and ergot 1 c.c. one half hour before the anesthetic is begun; no difference is made for ether, nitrous oxide or ethylene anesthesia. We are now starting a series following suggestions by Hooper and Gwathmey for preliminary medication as detailed in this journal.*

Many of the storms of the postoperative period are engendered by various degrees of adenamic ileus. We have for many years made routine use of pituitary extract to prevent adenamic ileus. As a preventative in full dosage it is excellent but its effect is rather transient. It may be augmented however, by the hypodermic use of ergot.

Our patients receive 1 c.c. of ergot when they are returned to bed. In the very few cases that are the least uncomfortable from gas pains, we use 1 c.c. of pituitrin and in one hour 1 c.c. of ergot.

During the past year the only cases that required more than this routine to control distension were cases with general peritonitis on admission. In these cases we use pituitrin and ergot in full dosage, being sure that if we can keep the intestinal walls in tone, their circulation active, and then institute drainage through a high enterostomy, we can save an unusually high percentage of these desperate cases.

My surgical associate, Dr. E. E. Palmer, and the medical members of our staff have all had repeated occasion to note the lessened postoperative vomiting, the freedom from all signs of shock, the smooth convalescence and ultimate recovery of some cases formerly regarded as hopeless.

I am particularly well pleased with my experience with ergot in prostatectomy. The last patient in this class was a man seventy-two years old. We had very little bleeding and a perfectly smooth convalescence. He voided on the twelfth day and rode over 100 miles to his home on the sixteenth day without untoward results. A man sixty-six years old, with marked nephritis, infected bladder, beaded arteries and a poor risk generally, was operated the day before the other one mentioned and while he stayed ten days longer in the hospital than the other, he voided normally on the sixteenth day and made an excellent recovery. He says he feels better than for ten years.

By the combined use of pituitrin, ergot and hemoplastin we have been able to control some cases of troublesome oozing.

In one case of unusually irritable stomach in which nothing could be retained for six days and yet no cause could be found, two 1 c.c. ampules of ergotin one hour apart apparently checked the trouble very promptly.

We believe with Dr. Moynihan that the greatest surgical improvements during the next decade will be in methods rather than technique, methods that will assure a smoother convalescence and more perfect end results. To this end we recommend a more extensive study of ergot.

* Preliminary medication in general anesthesia. *Am. J. Surg.*, 3: 598, 1927.

THYROIDECTOMY ANESTHESIA

A STUDY OF DIFFERENT METHODS OF ANESTHESIA USED IN 4000 GOITER OPERATIONS

JOSEPH L. DECOURCY, M.D.

CINCINNATI

THE question of the method of anesthesia is obviously of great importance in the conduct of a goiter operation. After the preoperative use of Lugol's solution and the general improvement in operative technique during recent years, a safe anesthetic method ranks as one of the most important factors conducive to low mortality. Pemberton attributes the relative freedom from postoperative hyperthyroid crises in part to the avoidance of prolonged general anesthesia and the use of special types of anesthetics as well as to the general improvement of technique and the preoperative use of iodine solution in modern operations.

It is true that ether and even chloroform are still frequently used for anesthesia in goiter operations. In fact, Gwathmey states that when general anesthesia is decided upon, ether and chloroform with oxygen by a tube is probably the best method. With this conclusion I disagree, as my experience has been that nitrous oxide and oxygen in combination furnish by far the safest, as well as an effective form of general anesthesia.

Crile has adopted the use of nitrous oxide and oxygen plus local infiltration almost as a routine in goiter surgery. By this combination he avoids the danger of psychic shock and also accomplishes anoci-association. Kocher's practice is to complete the operation under local anesthesia, and he attributes his low mortality to this method. Romanis, after operating upon 250 patients with exophthalmic goiter of all types of severity (many of them with a pulse rate over 180 and some with auricular fibrillation and other gross disorganization of the heart) with a mortality of 2.4 per cent, was convinced that the death rate is much lower under local anesthesia than under ether. Bartlett believes that the ideal anesthesia for goiter operations is produced by novocaine infiltration and nitrous oxide or light ethylene inhalation.

During the past ten years approximately 4000 goiter operations were performed at the DeCourcy Clinic. From this series it is possible to make certain deductions with regard to the safety and effectiveness of different methods of anesthesia.

The first 500 patients were operated upon under local anesthesia, which consisted of the free use of 0.1 per cent cocaine. Provided the solution was injected properly, it was found that no definite limitation as to the amount used was required. Under this anesthesia the skin incision, the cutting of the muscles and the division of the capsule were all accomplished in a satisfactory manner. But there was one drawback to the local anesthesia. When the gland was elevated from its bed and the capsule stripped back, the patient almost invariably complained of an uncomfortable feeling, that is, a sensation of being strangled. At this time he would frequently become panicky.

At that time patients who objected to local anesthesia were given ether by the open drop method. This anesthesia had the disadvantages of a stage of excitement, deep narcosis, disagreeable postoperative nausea and vomiting, and a penetrating effect on the operator and his assistants.

After completing the first 500 cases under local anesthesia, I began to realize that, although this technique may appear satisfactory to the operator and spectators, it is seldom appreciated by the patient.

Although no pain is felt in many instances, the psychic shock is always bad, the time consumed is usually twice as long as under general anesthesia, and the nervous tension suffered by the operator is apt to be considerable.

The second method of anesthesia tried consisted of local infiltration combined with nitrous oxide induction and light ether sequence. For a long time this procedure was found quite satisfactory. Induction was rapid, the amount of ether used small, the patient usually left the operating table in a conscious condition, and the stage of recovery was seldom more stormy than under local anesthesia.

About five years ago I started to use nitrous oxide and oxygen anesthesia for all goiter operations. I soon found that this procedure has many advantages. The anesthesia is not dreaded by the patient; it is induced rapidly and recovery is almost immediate. The dosage of anesthetic can be promptly regulated to fit the individual patient and the operative field remains very quiet, thus giving the surgeon a chance to do his best work. Nerve injury can easily be detected by the change in the respiratory rate and the crowing inspiration that sets in under this light anesthesia. There is no excess of mucus, and sufficient rigidity is maintained to keep the tongue from falling backward and thus obstructing the respiration.

If manipulations become unusually rough during the course of nitrous oxide and oxygen anesthesia, it takes but a moment to deepen the anesthesia. Should the patient temporarily refuse to breathe, he may soon be brought back to a safe level by the administration of pure oxygen under direct pressure.

After nitrous oxide and oxygen, recovery is almost immediate and the patient becomes conscious before leaving the table. Vomiting and retching are reduced to a minimum, and the danger of post-operative hemorrhage is almost nil.

Ethylene has been tried at the Clinic but discarded. It was found to have no advantage over nitrous oxide and oxygen, and its chief objection is its unpleasant odor. Everyone connected with my surgical team complained of a persistent headache when he was present during two or more ethylene anesthesias. Under ethylene anesthesia bleeding from the superficial structures of the neck was aggravated in our cases. It may have been due to the excess of oxygen present in the mixture. Patients showing a tendency to vomit did not recover so promptly as from nitrous oxide and oxygen. One patient vomited incessantly for three days.

Good judgment is required in the choice of the anesthetic. If the anesthetist finds himself confronted with a situation wherein a given anesthetic agent does not produce the desired result, he should without hesitation resort to other agents in order that a well-balanced anesthesia may be produced with as little untoward result as possible prior to, during and after operation.

My belief is that every goiter operation is facilitated by nitrous oxide and oxygen anesthesia properly administered, but the anesthetist should be skilled in both local and general anesthesia and prepared to give up one type and return to another as occasion demands.

During nitrous oxide and oxygen anesthesia the anesthetist should attempt to keep the patient asleep and his color natural. The skin should remain as pink as possible, whether or not the patient sleeps soundly. A vicious circle is easily established by continued cyanosis. When respiration becomes insufficient, the blood gets blue or black and the pulse weaker and weaker because of the progressive decrease of available oxygen. Lack of oxygen in turn depresses the circulation and deficient circulation diminishes oxidation. Finally a point is reached at which the circulation is insufficient to aerate the tissues even when pure oxygen is administered. When general anesthesia is superimposed on the foundation provided by preliminary hypnotics and local anesthet-

ics, it should not be carried to the point at which the patient's natural color changes.

About 70 per cent of all goiter patients presenting themselves for operation do so because of urgent symptoms referred to the circulatory or respiratory apparatus. In many cases cardiac arrhythmias also are present. Practically all thyroid patients are prone to cyanosis and respiratory obstruction during some part of the operation. This condition may be due to the size or position of the gland or to the strained posture of the shoulders on the sand bag, which throws the head too far backward. In this connection obstruction in the mouth or throat must be kept in mind.

The anesthetist should at all times know the condition of his patient's circulation. The pulse and blood pressure ratios and reactions are prerequisites for the interpretation of the circulatory condition. Cardiac arrhythmias affecting the rate may readily be detected in the pulse. The functional types often disappear during a carefully conducted anesthesia; in fact, the circulation may improve with anesthesia in functional cases. The organic types, on the other hand, either do not improve or are made worse.

By means of the sphygmomanometer, pulsus alternans, which is an arrhythmia not necessarily affecting the rate but characterized by alternating weak and strong heart contractions, may not only be readily detected but actually measured. Arrhythmias, particularly of this type, require close watching because they are associated with serious impairment of the muscular structure of the heart, which has lost the capacity to respond to every stimulus with a maximal contraction; in other words, the contracting capacity is diminished. In the surgery of the thyroid gland pulsus alternans is second in frequency of the cardiac arrhythmias, and it is of particular importance because it indicates myocardial defect. Before operation the patient may exhibit no arrhythmia, but under the stress of the manipulations pulsus alternans occasionally develops. In such cases it is an indication that the heart muscle is unable to respond adequately to the extra effort. Pulsus alternans is encountered more frequently in hypertension, arteriosclerosis, myocarditis and nephritis. Such patients are likely to succumb promptly to a fall in blood pressure associated with an increased pulse rate.

If pulsus alternans is recognized before operation, digitalis is indicated, even though the pulse rate is not rapid. When it develops during operation, some digitalis preparation should be administered intravenously and the operation should proceed with the minimum of trauma and under the lightest possible narcosis. Morphine in sufficient dosage to produce physiologic effect is helpful, preferably administered before operation, but it may also be used with good results during the thyroidectomy.

Myocardial defects are more serious than compensated valvular disease. The crux of the matter is whether or not the circulatory mechanism is able to maintain a proper distribution of blood without cardiac exhaustion during the relatively short period of surgical intervention. A study of the individual case at the moment will show how far one may proceed with the thyroidectomy when cardiac action is impaired, but only the test of surgery will tell how the circulation will react in border line cases of cardiac defect.

Patients with valvular defects grossly complicated with myocardial weakness require most careful anesthesia and surgery to avoid disaster. Until the test of surgery proves the heart muscle to contain the essential reserve power to compensate for any ordinary disturbance in blood distribution, all valvular cases must be regarded with suspicion and treated with caution.

During the ten years that I have been performing thyroidectomies I have had occasion to deal with every conceivable type of patient from the age of eleven to that of seventy. Every type of goiter has been attacked, including six malignant

glands. Ligation of the posterior and inferior thyroid arteries, respectively, has been employed. In some very severe cases lobectomy with removal of the remaining lobe on the following day was practiced.

In the 4000 cases at the Clinic there was but one death on the table. This accident resulted from an injury to the jugular vein, which was adherent to the thyroid capsule. One patient was anesthetized three times in a period of two hours to permit control of hemorrhage with no bad results. There were but two cases of nerve injury.

Although the most difficult to administer, nitrous oxide and oxygen with proper preliminary medication is the anesthetic of choice for thyroidectomy. What the patient appreciates most in this anesthesia is the sensation of being "blown asleep." I am indebted to the dental profession for an observation which I have made with regard to the method of inducing anesthesia with nitrous oxide. The trick is not to hold the mask against the face while inducing anesthesia but to blow the gas into the patient's face. When this is done, the patient is free from the choking sensation so common when the mask is held firmly against the face during the induction of anesthesia.

Nitrous oxide and oxygen anesthesia for goiter operations would probably be a great deal more popular than it is, were it not for the fact that its administration requires considerable skill and training. It is not a method that commends itself to the lazy mind. Once mastered, however, it is most satisfactory both to the patient and the surgical team. I agree with Gwathmey, who states that "those who have never used oxygen with nitrous oxide, and who have acquired the technique of administering it alone, will be surprised by the ease and latitude given by this combination."

The best results in goiter surgery are obtained when a surgical team of definite personnel is organized. The surgeon himself must have unbounded confidence in his first assistant, who in turn must understand and anticipate his every move. There must be a close liaison between the surgeon and the anesthetist. The anesthetist should be consulted frequently with regard to the advisability of doing a complete or incomplete operation in one stage, whether it would be safer to close the wound in the neck after operation or to leave it open for twenty-four to thirty-six hours.

The anesthetist must be quick to recognize changes in the respiratory rate, the pulse rate and the color signs, and he must understand the condition of the heart before and during operation. He must also warn the surgeon of any manipulations that are proving dangerous to the patient.

When this sort of team work is practiced as a unit for the patient's welfare, one may be assured of the highest degree of success in the surgical treatment of goiter.

CONCLUSIONS

1. On the basis of experience in 4000 goiter operations, I believe that the combination of nitrous oxide and oxygen offers the most satisfactory form of anesthesia for thyroidectomy.

2. The method is rather difficult and requires a trained anesthetist. Once mastered, however, its use is highly satisfactory both to the patient and the surgical team.

3. There is no danger of asphyxia, because pure oxygen under pressure may be forced in at any time.

4. The anesthetist should regard his patient from the point of view of an internist. He should study him carefully before, during and after operation. The use of the sphygmomanometer and the study of the blood and pulse pressures during operation are of much importance.

5. The closest possible liaison between the surgeon, his assistants and the anesthetist is a powerful factor in reducing mortality to a minimum.

CASE REPORTS

MALIGNANT PAPILLOMATOUS CYSTADENOMA*

WILLIAM L. KELLER, M.D., F.A.C.S.

WASHINGTON

E. T., aged nineteen, a white, unmarried American girl, was admitted to Walter Reed General Hospital, January 13, 1927, complaining of loss of weight, and a palpable tumor in the left upper quadrant accompanied by almost constant pain. At the age of twelve years while playing in the street near her home she had been hit by a truck, thrown into the air and, falling across the hood, had struck her abdomen on the radiator cap. Following the injury she was confined to bed, the exact length of time not recalled. Two years prior to admission she began to have pain and a heavy, dragging sensation in the left upper quadrant. This was soon followed by frequent, recurrent attacks of colicy pain in this area which occurred at irregular intervals and were not related to any particular system. It was at this time also that the patient first noticed the presence of a movable tumor mass. About December 15, 1926, she had an attack of obstinate constipation and her pain became much worse. Several days later she was taken to a hospital in an Eastern city where a diagnosis was made of left hydronephrosis of the intermittent type with nephroptosis, and operation was advised. Roentgen-ray findings at that time were suggestive of gastric ulcer. She refused operation and left the hospital after four days. The pain in the left upper quadrant continued almost constantly.

At the time of admission to Walter Reed Hospital the patient appeared in good general condition although about six pounds underweight. She stated that she had lost approximately 12 lbs. in the past two years and that during this period she thought the tumor had increased noticeably in size. Upon examination a freely movable, tender mass was felt in the left upper quadrant. This was indefinite in outline and size but seemed separate from the spleen which could be palpated at the left costal margin. The left kidney and the liver could not be palpated. Urological examination showed a normal bladder. The ureteral catheter entered the left ureter for a distance of only 10 cm. A pyelogram demonstrated a right angle kink at the brim of the bony pelvis and another slight kink just below the renal pelvis. There was no hydronephrosis and the kidney appeared to be in normal position. Roentgen-ray examination of the gastrointestinal tract showed the stomach displaced to the right by the mass. There was marked pressure deformity of the greater curvature of the pars media, and the splenic flexure was depressed. The colon filled normally by enema with no evidence of obstruction or filling defect. The urine contained no pus nor blood but showed albumin on one occasion. Tubercle bacilli were not found and cultures were sterile. Examination of the blood showed 75 per cent hemoglobin, 3,780,000 erythrocytes and 6,000 leucocytes, the polymorphonuclear cells amounting to 74 per cent. The non-protein nitrogen was estimated at 29 mg., and the Wassermann reaction and the Kahn test were negative.

On February 23, 1927, the patient was operated upon and there was found a large tumor which was densely adherent to the spleen, the stomach, the splenic flexure of the colon and to the tail of the pancreas. This tumor was removed with great difficulty on account of thick adhesions; it was necessary to excise a portion of the tail of the pancreas along with the growth. Convalescence was stormy and the wound drained freely for almost two weeks. On March 3, 1927, her erythrocytes numbered 2,500,000 and the hemoglobin was only 65 per cent. A transfusion with citrated blood was followed by a moderate reaction. The patient was discharged

* Published with permission of the Surgeon General, U. S. Army, who is not responsible for any opinion expressed or conclusion reached herein.

from the hospital April 3, 1927, in good general condition, the operation wound firmly healed.

The tumor removed at operation was a papillomatous cystadenoma, embryonal in origin and histologically malignant. To the unaided eye, it appeared roughly globular (Fig. 1) and measured 11.5 cm. in diameter. The capsule was white and smooth except for several roughened areas of adhesions and a small protruding mass representing the tip of the pancreas. On section the capsule was found to be dense, hyalinized and fibrous, somewhat laminated, and of uniform thickness, measuring about 0.3 cm. The cavity of the cyst (Fig. 2) was entirely filled with a soft, friable, pinkish mass, spongy in appearance and suggested either fibrin or a villous new growth. In the tissues beneath the capsule were streaks of yellow but otherwise the contents were of the same color and consistency throughout, and there was little stroma or necrosis visible.

Fig. 1. Gross specimen, reduced one half. External view of tumor.

Microscopically, the deeper layers of the dense, hyalinized, fibrous capsule contained many cholestrin spaces (Fig. 3) and foreign-body giant cells. The tumor was embryonal in type and showed villous arrangement of small epithelial cells, the villi having thin, vascular cores. In places the epithelium was so densely packed that the papillary arrangement could not be distinguished (Fig. 4). There were extensive areas of necrosis and here and there were found large, isolated cells containing fat but showing no particular arrangement (Fig. 5). The tumor was actively growing and histologically was considered malignant with the possibility that it had broken through at the pancreatic attachment. No pancreas cells could be identified. A small lymph node at the pancreatic adhesion was not invaded by the tumor.

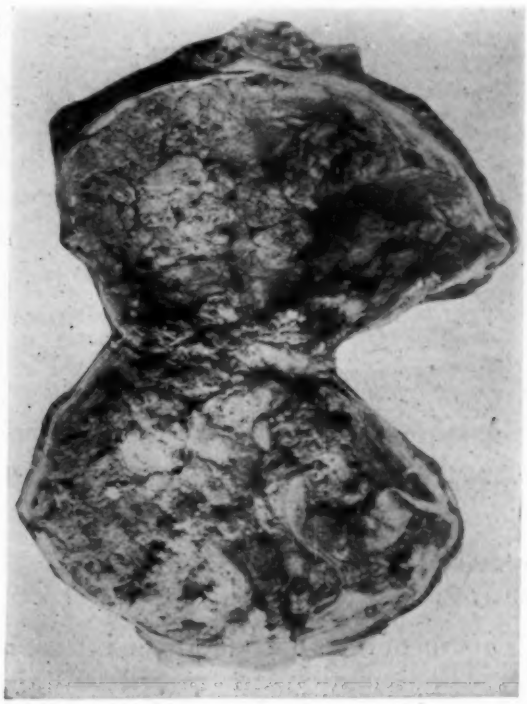


Fig. 2. Gross specimen, reduced one half. Cut to show villous arrangement of contents.

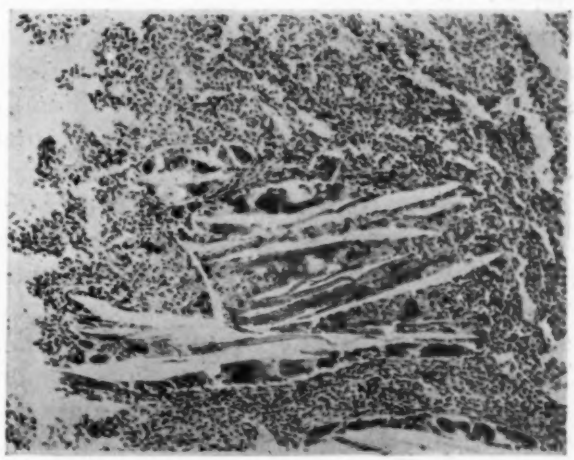


Fig. 3. Microphotograph showing cholestrin spaces and foreign body giant cells.

Communication received one year later relative to this patient states that she is in good

condition. There has been no metastasis or recurrence subsequent to discharge. Patient gained weight rapidly after discharge from hospital and has been engaged almost constantly in daily occupation.

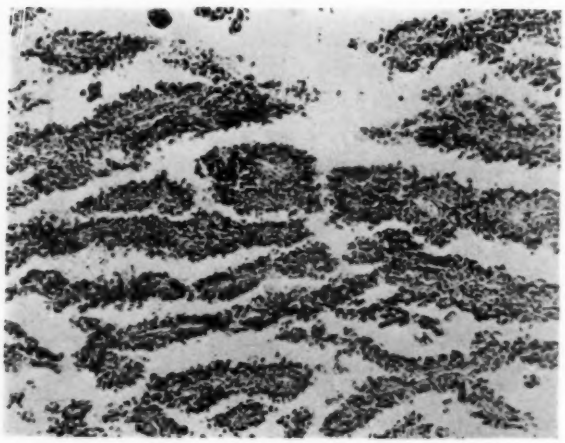


Fig. 4. Microphotograph showing papillary structure of tumor.

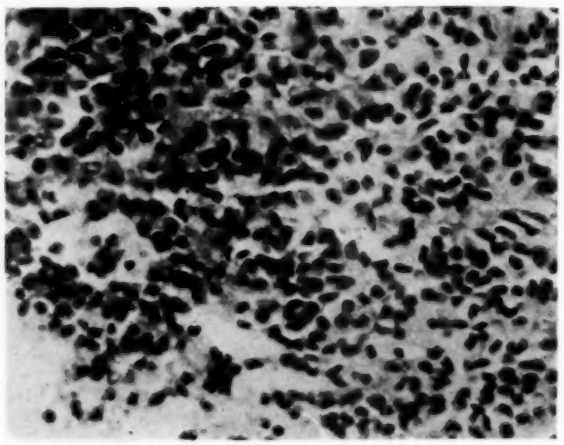


Fig. 5. Microphotograph (high power) showing individual cell characteristics.

Tumors of the upper abdomen invariably arouse speculation in regard to their probably source and pathology. In this case several possibilities presented themselves. Kidney and suprarenal "cell rests" as likely sources must be considered but, on the basis of statistics alone, the origin was probably pancreatic although there are few reports of tumors occurring in the particular location of this case. Based upon the histological picture, origin from suprarenal rest could be excluded with some certainty because of the papillomatous feature and the tendency in the groups of the larger, clear cells to form lumina. Kidney rest was more difficult to exclude but the majority of tumors arising from the kidney are more closely associated with the parent organ, either embedded in the substance or arising from the capsule. There are retroperitoneal tumors which undoubtedly have their origin in embryonal kidney elements but these are usually in the lower abdomen or pelvis. The preponderance of small cells and the cholestrin content suggested pancreas. These "typical" tumors of hypoblastic origin, the so-called pancreatic cysts (cystadenoma) have been recognized for years and have been seen to show a tendency to develop intracystic papilloma, filling the cyst with branching and complicated masses of epithelial processes such as found here. Cystadenomas exhibiting papillary processes occur more rarely in the kidney and when they do the characteristic cells from the persistent mesothelium of the embryo are present. We know that some of the cystadenomas occur in the parent organ and some are sharply encapsulated from the mother tissue as this one was.

The malignancy of any tumor is most important and sometimes quite difficult to decide. In this case we had a history of an old injury. While the rate of growth is slow the presence of a capsule as well as the absence of any definite infiltration of surrounding tissue rather discounts malignancy in the clinical sense. Nevertheless, the tumor cells were embryonic in type and there was a tendency to degenerative changes as shown by the cholestrin and other products of cell degeneration. While active infiltrative growth was not seen, the possibility of breaking through in the vicinity of the pancreatic attachment, which could not be separated, was strong.

FIBROSARCOMA OF THE JEJUNUM

Andrew B. Rivers, M.D. and Howard R. Hartman, M.D.

ROCHESTER, MINNESOTA

A WOMAN aged thirty-eight came to the Mayo Clinic for examination because of unusual fatigue following slight exertion and epigastric distress for several hours after eating. These symptoms had appeared about three years previously. Her mother's brother had died from cancer of the face. At the age of six she had had scarlet fever and at twenty-seven typhoid fever. Because of repeated attacks of tonsillitis, tonsillectomy had been performed several years previously. The epigastric distress consisted of a hungry sensation and slight nausea associated with a sensation of fullness in the epigastrium. Some loss in weight had been noticed. She soon found that a glass of milk would relieve the nausea. A bland, high-calorie diet and alkaline tablets were prescribed with beneficial results. She improved promptly and remained well for a year. About ten months before presenting herself for examination at the clinic the symptoms recurred. She continued to work but under extreme effort mainly because of marked weakness. She lost weight and became increasingly weak. Six weeks before examination she became dizzy and fainted. After regaining consciousness she vomited about a quart of blood. Several days later she had another attack of dizziness following which she vomited much blood.

The patient was poorly nourished; the skin and mucous membranes were pale. The systolic blood pressure was 110 and the diastolic 70. The temperature was 98°, and the pulse was 94. There was some evidence of dental infection. The tonsils had been cleanly removed. Examination of the heart and lungs was negative. There was slight spasm over the upper part of the abdomen making palpation difficult and unsatisfactory. Examination of the pelvis failed to show anything of importance. Urinalysis was negative. The blood urea was 14 mg. for each 100 c.c. The hemoglobin was 31 per cent, erythrocytes numbered 2,730,000, and the leucocytes 4,100. The differential count showed lymphocytes 25 per cent, large mononuclears 8 per cent, transitionals 2 per cent, and polymorphonuclears 65 per cent. Slight anisocytosis and poikilocytosis were shown by the blood smears. The reticulated cells were 0.8 per cent, the platelet count 200,000 and 140,000. Coagulation, calcium, bleeding and prothrombin time were normal. The Wassermann test was negative. The basal metabolic rate was −3. Investigation of the gastric acidity disclosed values of 60 for total acids and 42 for free acids; 90 c.c. were recovered. Three roentgen-ray examinations of the stomach and duodenum failed to show any evidence of trouble. Roentgenograms of the chest and gall-bladder were also negative. A small amount of blood was found in the stool.

A diagnosis of a bleeding, probably inflammatory, peptic lesion was made and the patient was transferred to the hospital for further observation and treatment. A transfusion was given. A bland, high-calorie diet, and small amounts of alkalis were instituted. The blood promptly disappeared from the stools and the erythrocytes increased to 3,400,000. Several infected teeth were removed. Clinically, however, there was no improvement; at intervals of a few days the patient complained of severe nausea and a feeling of epigastric fullness, but there was no pain. Aspiration of gastric contents during the times she had pain revealed low acidity. The amount expressed never exceeded 200 c.c. There was no food residue. Because the symptoms failed to disappear on this regimen it was decided that some cause other than peptic ulcer was responsible for the trouble and an exploration was advised.

At operation a thick-walled, long, chronically diseased appendix was found and removed. The right ovary contained a hemorrhagic cyst about 5 cm. in diameter which was ruptured. A tumor about 2.5 cm. in diameter was found in the upper part of the jejunum, 15 cm. from its origin. This was excised as a wedge and the bowel resutured. The tumor was adherent to the omentum close to the transverse colon. The stomach and duodenum were dilated and the gall-bladder was adherent to the duodenum.

Pathologic data: An area denuded of epithelium, about 4 cm. in diameter, was surrounded by healthy looking mucosa but sharply demarcated from it. Sections for microscopic examination from this area showed the mass to be composed of embryonic connective-tissue cells

with a few fibrils (Fig. 1) and an occasional irregular mitotic figure (Fig. 2). The vessels were poorly formed and there was no sign of inflammation. The tumor had not apparently invaded the muscular layers of the intestinal wall. Van Giesen stain showed the fibrils distinctly (Fig. 3), but they did not take on a pinkish stain characteristic of adult or more fully differentiated connective tissue (Fig. 4). Pathologic diagnosis revealed fibrosarcoma of the jejunum.

FIG. 1. Tumor of jejunum showing sharp line of demarcation between tissue and normal mucosa. Little ulceration is present.

DISCUSSION

Sarcoma is rarely found in the intestine. Smaler noted thirteen cases in 13,036 necropsies. Staemmler noted thirty-three cases in records of 54,000 necropsies (0.06 per cent). In the 400 cases reviewed by him 218 were situated in the small bowel. Histologically 153 cases were sarcoma of the intestine. These were classified as: round-cell sarcoma, sixty-one; lymphosarcoma, forty-four; spindle-cell sarcoma, nineteen; myosarcoma, seven; myxosarcoma, four; fibrosarcoma, four; polymorphonuclear cell sarcoma, four; alveolar sarcoma, four; melanotic sarcoma, two; endothelioma, two, and angiosarcoma, one. Except in cases of lymphosarcoma, which may be part of a general lymphosarcomatosis, it can usually be assumed that sarcoma of the intestine is primary there. Regarding metastasis, Libman believes that there is little or no metastasis from spindle-cell sarcoma and generally extensive metastasis from lymphosarcoma, "every abdominal organ and tissue being liable to invasion." Sarcoma of the intestines may develop at any age. Occurrence is about equally divided between males and females.

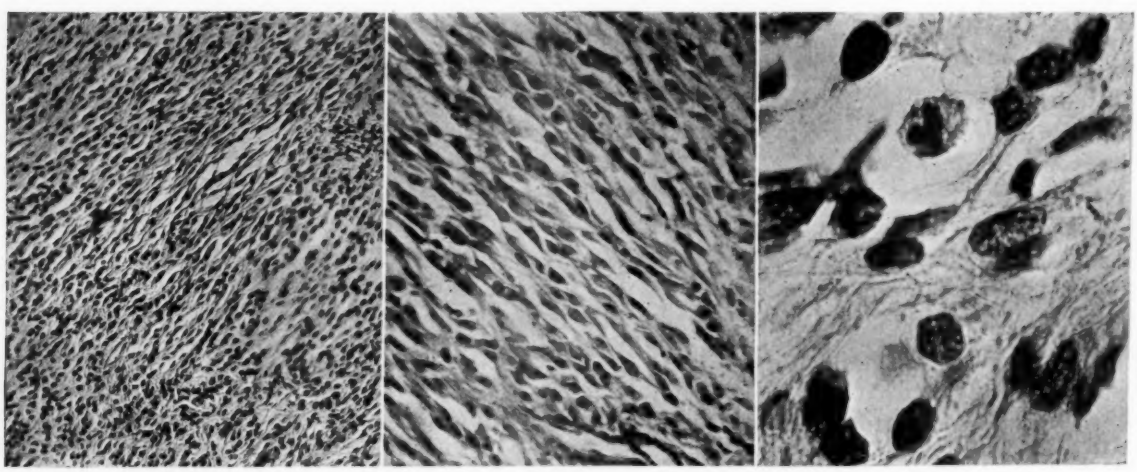


FIG. 2. FIG. 3. FIG. 4.

FIG. 2. Section from edge of tumor showing the connective tissue type of cells and nuclei. Hematoxylin and eosin stain.

FIG. 3. Fibrous tumor with the fairly well developed fibrils and cell bodies. Van Gieson stain.

FIG. 4. One irregular mitotic figure, the rather oval or oat-shaped nuclei fibrils can be seen. Hematoxylin and eosin.

The symptoms are extremely indefinite. They may best be divided into those arising

from cachexia or in association with it, and those arising from mechanical difficulties caused by the tumor. Ochsner describes one of the early symptoms as indefinite abdominal pain persistent and unrelieved by rest and starvation, colicy and not particularly well localized. In the case reported here the patient had never experienced pain. The mild abdominal distress at intervals was probably the result of duodenal and gastric dilation; the obstruction was of variable intensity but never complete. Regarding the symptomatology of intestinal sarcoma, Baltzer said: "The symptoms are very slight at the onset. There is at first pain in the stomach, loss of appetite, nausea, vomiting; the bowels are irregular, being either constipated or loose. The abdomen soon becomes distended. When seen early all the patients are very thin and have a pale color. A tumor is generally found, although it may be missed for a long time; it may be located in any part of the abdomen and it is generally but slightly or not at all tender. The temperature is normal or moderately elevated. In some cases there is a leucocytosis. The duration of the disease varies from two weeks to one and three-quarter years, but most patients die within nine months."

It is not always possible to palpate a mass, nor is there anything diagnostic in the physical characteristics of the tumor. There is marked variability of the size of the tumor; usually it is quite large before it is detected. Libman says: "The growth may be large or small, single or multiple. The lymphosarcomas often feel like one irregular tumor, whereas in reality the growth in the intestine is very small and the irregularity is due to growths in the peritoneum and lymph nodes. At times small nodules are found which feel like lymph nodes but which on post-mortem examination prove to be infiltrating appendices epiploicale. The tumor may be superficial or deep. It may be possible to feel one large tumor and scattered nodules all over the abdomen, some feeling as if they were in the parietal peritoneum. The tumor is generally slightly or not at all tender. The growths usually move with respiration." Although extensive hemorrhage from sarcoma of the intestine is not common, examination of the blood almost always discloses a definite secondary type of anemia.

Pressure or twisting of the tumor may cause abdominal distention and if pressure is made on the vessels there usually is ascites, edema of the legs, or distention of the veins in the abdomen or thorax. Probably the most significant clinical and pathologic feature of these lesions is that they rarely cause complete intestinal obstruction. In this they differ from carcinoma. If complete obstruction does occur it is usually the result of intussusception (as was noted in fourteen of seventy-four cases studied by Speese), and not to intrinsic invasion of the intestinal lumen by tumor tissue.

There are no exact rules to follow in making a clean-cut differential diagnosis of sarcoma of the jejunum. Laparotomy is indicated when the lesion is suspected. Operation is the only reliable method of treatment although some good results may occasionally be obtained by the use of radium. Deep roentgen-ray treatment and the use of large doses of arsenic have also been advised.

The results following resection of the small intestine for sarcoma are good. Of seventy-five patients treated by Speese in this manner fifty-five recovered and nineteen died. In nine instances there was recurrence, in seven of which lymphosarcoma was found.

In spite of the fact that a sarcoma was found in the case here reported, we are still not certain that this explains the bleeding. The adhesions about the duodenum and gall bladder suggest the possibility of an inflammatory duodenal lesion which could have been responsible for the hemorrhage.

BIBLIOGRAPHY

1. Baltzer, M. Ueber primäre Dunndarmsarcome: *Arch. f. klin. Chir.*, 44: 715, 1892.
2. Libman, E. Sarcoma of the small intestine. *Am. J. M. Sc.*, 120: 309, 1900.
3. Ochsner, A. J. Surgical Diagnosis and Treatment. Phila., Lea and Febiger, 1921, vol. 3, 47–48.
4. Speese, J. Sarcoma of the small intestine. *Ann. Surg.*, 59: 727, 1914.
5. Staemmler, M. Die Neubildungen des Darmes. Stuttgart, Enke, Neue Deutsche Chirurgie, 33. 308, 1924.

END RESULTS OF GASTIC RESECTION

REPORT OF NINE CASES

THOMAS H. RUSSELL, M.D., F.A.C.S.

NEW YORK

CASE I. J. B., aged fifty-five years. Admitted to Post Graduate Hospital May 31, 1926, for chronic duodenal ulcer, supposedly of sixteen years duration. On June 1, 1926, I did a resection of the stomach, back to the angle with a Polya anastomosis. Appendix removed at same time. Discharged June 17, 1926. Patient informs me has not sought treatment since.

CASE II. C. G., aged thirty-four. Referred to Post Graduate Hospital, Oct. 1, 1926, with diagnosis of large ulcer in lesser curvature of stomach. Operation, Oct. 2, 1926, subtotal gastrectomy with Polya anastomosis and appendectomy. Discharged, Oct. 16, 1926. Has reported to me several times since and states he is free of symptoms.

CASE III. F. C., aged twenty-eight. Referred to Post Graduate Hospital, April 24, 1927. Roentgenogram showed duodenal ulcer.

Patient operated upon by Dr. John Erdmann October 28, 1925, for gall bladder, appendix and excision of a scar which was taken to be an ulcer. No relief from symptoms. On April 25, 1927, I operated and found adhesions of duodenum to the surface of the liver and numerous scars and thickening of the duodenum. Partial gastrectomy, Polya anastomosis. Discharged, May 8, 1927.

Patient (December 2, 1927) complains of constipation. Aside from this he says he is well and does not use any diet or medication.

CASE IV. I. M., aged thirty-one. Referred to me at Post Graduate Hospital July 1, 1927, for operation for chronic duodenal ulcer.

July 8, 1927, I operated and found duodenal ulcer perforated into pancreas. I removed a badly diseased appendix and right half of the stomach, and made a Polya anastomosis.

Discharged, August 5, 1927. Patient reports (December 2, 1927) that he is now in "excellent health" and eats everything.

CASE V. J. H., aged forty-two. Referred to me on February 16, 1926, with a history of stomach trouble for twelve years. Six years ago asserts had a cure under Dr. Thayer of Johns Hopkins; was advised to never have an operation. Examination and roentgenogram showed a chronic peptic ulcer of the duodenum.

On February 23, 1926 at the Post Graduate Hospital I operated and removed appendix, gall-bladder and distal half of stomach with Polya anastomosis. Discharged March 7, 1926. Has been well since.

CASE VI. C. M., aged fifty-one. Referred to me on January 21, 1926, for stomach trouble, eight years duration. Examination and roentgenogram showed an old chronic duodenal ulcer.

On February 10, 1927, at the Post Graduate Hospital I operated and found a large indurated ulcer in second portion of the duodenum, with an adherent gall-bladder. Appendix, gall bladder and distal half of stomach removed with a Polya anastomosis. Discharged February 22, 1926. Patient comes to see me when I write him every six months, and reports he is feeling well. Reported (December 2, 1927) that he is well and does not have to diet.

CASE VII. J. P., aged twenty-three. Was referred to me for operation May 26, 1925, by Dr. John Erdmann from his service at Post Graduate Hospital. This patient had been operated upon by Dr. Erdmann on December 28, 1923, for a chronic duodenal ulcer on the posterior wall of the first portion of the duodenum. Dr. Erdmann did a transduodenal cautery excision after method of Balfour. Patient stated he was improved for a few months when former symptoms returned.

On May 26, 1925, I operated and found a large ulcer on posterior wall of duodenum. Patient had lost a great deal of weight and condition was such as to make me think a resection of stomach would be an unusual risk, so I did a posterior gastroenterostomy. Patient was discharged from hospital June 12, 1925, feeling much improved.

Patient was admitted to Post Graduate Hospital on July 1, 1925, 2 weeks after discharge, complaining of return of former

symptoms, which were much more severe. In addition there was pain just to the left of the umbilicus and referred downwards. This latter pain was continuous and very severe most of the time. Gastrointestinal roentgenogram at this time revealed a gastrojejunal ulcer at site of anastomosis. This was thirty-six days after the gastroenterostomy had been performed. When I again suggested operation the patient went home but was good enough to return to the hospital on July 27, 1925, in a very much worse condition than he was when I did the gastroenterostomy eight weeks before.

Roentgen-ray examination was repeated with again a diagnosis of a marginal ulcer. Patient was reoperated upon by me on August 5, 1925. I again found the large duodenal ulcer and in addition a marginal ulcer an inch and a quarter long and one quarter inch wide at the site of the anastomosis. I disassociated the intestine from the stomach, resected six inches of the jejunum and did an end-to-end anastomosis; then resected the distal half of the stomach and portion of the duodenum containing the ulcer and did a Polya anastomosis at a point distal to the end-to-end anastomosis of the jejunum.

Patient made a satisfactory recovery and was discharged on August 23, 1925, eighteen days after the resection. He has been to see me several time since to tell me that he was perfectly well.

In response to a recent letter, he wrote and said he felt well and was "having no trouble at all." This case no doubt illustrates the value of resection, certainly in some cases.

Case VIII. M. D., aged fifty-one. Admitted to Post Graduate Hospital on July 2, 1926. Was referred to me from the medical service for operation for a chronic duodenal ulcer. On July 2nd I resected the right half of the stomach and portion of the duodenum containing the ulcer with a Polya anastomosis. Appendix also removed. Discharged, July 20, 1926.

Patient states (December 2, 1927) that he has had no further trouble.

Case IX. J. M., aged forty-nine. Referred to Post Graduate Hospital March 11, 1926, with diagnosis of chronic duodenal ulcer. Had a posterior gastroenterostomy performed by Dr. John Erdmann for duodenal ulcer during the year of 1915. Felt well until 1923 when former symptoms of ulcer recurred and became so pronounced that surgical relief was sought.

On March 12, 1926, I resected the distal half of the stomach, for a large indurated duodenal ulcer, retaining the gastro-enterostomy. At the same time I also removed the gall bladder which was adherent to the duodenum. Patient made a stormy recovery but was discharged on March 29th, 1926 seventeen days after the operation, and has been very comfortable since.

Patient stated (December 2, 1927) that he ate a heavy dinner that night as he does every night and feels better than he has ever felt. Was checked up by roentgenogram at the New York Hospital recently and nothing abnormal was found.

The American Journal of Surgery

Publishing the Transactions of THE AMERICAN ASSOCIATION FOR THE STUDY OF GOITER; THE NEW YORK UROLOGICAL SOCIETY; SECTIONS OF SURGERY, GENITO-URINARY SURGERY AND ORTHOPEDIC SURGERY OF THE NEW YORK ACADEMY OF MEDICINE; LOS ANGELES SURGICAL SOCIETY, ETC.

Editor: THURSTON SCOTT WELTON, M.D., F.A.C.S., NEW YORK

EDITORIAL BOARD

WM. S. BAER, *Balt.*; ALEXIS CARREL, *N.Y.*; JAMES T. CASE, *Battle Creek*; A. C. CHRISTIE, *Washington*; W. B. COLEY, *N.Y.*; FREDERIC J. COTTON, *Boston*; GEORGE W. CRILE, *Cleveland*; PAOLO DE VECCHI, *N.Y.*; CHARLES A. ELSBERG, *N.Y.*; C. R. G. FORRESTER, *Chicago*; W. EDWARD GALLIE, *Toronto*; JOHN H. GIBBON, *Phila.*; DONALD GUTHRIE, *Sayre, Pa.*; A. E. HERTZLER, *Kansas City*; C. GORDON HEYD, *N.Y.*; JAMES M. HITZROT, *N.Y.*; REGINALD H. JACKSON, *Madison*; A. F. JONAS, *Omaha*; WM. L. KELLER, *Washington*; A. V. S. LAMBERT, *N.Y.*; SOUTHGATE LEIGH, *Norfolk*; H. H. M. LYLE, *N.Y.*; JEROME M. LYNCH, *N.Y.*; URBAN MAES, *N.O.*; ROY D. MCCLURE, *Detroit*; RUDOLPH MATAS, *N.O.*; HARRY E. MOCK, *Chicago*; F. R. PACKARD, *Phila.*; JOHN O. POLAK, *Brooklyn*; DOUGLAS QUICK, *N.Y.*; HUBERT A. ROYSTER, *Raleigh*; A. C. SCOTT, *Temple, Texas*; M. G. SEELIG, *St. Louis*; J. BENTLEY SQUIER, *N.Y.*; NORMAN E. TITUS, *N.Y.*; J. M. WAINWRIGHT, *Scranton*; F. C. WARNSHUIS, *Grand Rapids*; ALLEN O. WHIPPLE, *N.Y.*

Foreign Collaborators—GREAT BRITAIN—J. JOHNSON ABRAHAM, *London*; E. F. FINCH, *Sheffield*; ANDREW FULLERTON, *Belfast*; BASIL HUGHES, *Bradford*; GEOFFREY JEFFERSON, *Manchester*; SIR ROBERT JONES, *Liverpool*; R. E. KELLY, *Liverpool*; G. P. MILLS, *Birmingham*; C. MAX PAGE, *London*; S. S. PRINGLE, *Dublin*; J. J. M. SHAW, *Edinburgh*; H. S. SOUTTAR, *London*; J. H. WATSON, *Burnley*.
FRANCE—G. JEANNENEY, *Bordeaux*. ITALY—RAFFAELE BASTIANELLI, *Rome*.

EDITORIAL

COMMON ABUSES

IN the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION of July 21, 1928 was an editorial, "Present-Day Aspects of Acute Appendicitis, in which the writer, who yielded a trenchant pen, warned against the "growing sense of safety in relation to appendicitis," and said: "the seriousness of appendicitis as a professional problem is indicated by recently collected figures from the Bureau of Vital Statistics, which show that about 25,000 people die annually in the United States from the acute form." The writer particularly drew attention to the urgent warning of the North Dakota surgeons about the "danger of giving laxatives haphazardly in acute abdominal lesions." Every surgeon knows that castor oil, salts and other "bowel remedies" aggravate and raise havoc in acute appendicitis; needless waiting, plus a laxative, has cost countless lives in this disease.

Probably next in order as a common abuse, with some physicians as well as the laity in general, is the ice-bag. Cold applied to a part will aid in relieving pain temporarily. An ice-bag over the appendicular region will lessen the suffering in the presence of an appendix acutely infected. This sense of comfort is accepted by many as an indication that the trouble is subsiding. Often, too late, the error is discovered and the victim is placed beyond the range of human aid. The phrase, "the doctor froze it out," meaning the physician overcame an acute appendicitis by applying ice-bags, is a common one with the man-on-the-street and has filled many graves.

We remember at a popular lecture on acute appendicitis, given to physicians, a general practitioner at the conclusion of the talk asked the speaker if ice-bags applied over the region of the appendix did not sometimes cure. The speaker was the late William Francis Campbell, a teacher with a fine sense of the dramatic. When the questioner had propounded his query there was a pause and Campbell raising

his hand said: "Gentlemen, when you use ice in the cure of acute appendicitis you are gambling with death, and the dice are loaded against you!!"

We hear murmurs from near and afar that appendicitis is a worn-out subject. Editorially, to be popular, it is well to detour around it. A page on the merits of panhysterectomy versus salpingectomy in cases of papillary cystadenoma of the ovaries might tend to create a more profound editorial sense of the fitness of things.

But until surgeons are called in consultation in cases of acute appendicitis before patients are one step from death, and have been epsom-salted, castor-oiled and ice-capped, and until the deaths to the number of 25,000 annually from acute appendicitis in the United States show a decided reduction, this subject will continue to be front page matter in the Editorial Section of medical and surgical journals.

The employment of laxatives and the improper use of ice are two "don'ts" in acute appendicitis. Other pathological states, also, have their common abuses; the obstetrician knows there is no expectant treatment in placenta praevia; the urologist forbids metal catheters in retention; the list is a long one. We would like to index the abuses in various surgical conditions as met with and found to be commonplaces by those doing surgical specialities.

T. S. W.

Subscribers to The American Journal of Surgery *visiting New York City are invited to make the office of the publishers (Paul B. Hoeber, Inc., 76 Fifth Avenue, New York) their headquarters. Mail, packages or bundles may be addressed in our care. Hotel reservations will gladly be made for those advising us in advance; kindly notify us in detail as to requirements and prices. List of operations in New York hospitals on file in our office daily.*

[From Fernelius' Universa Medicina, Geneva, 1679.]

BOOKSHELF BROWSING

NOGUCHI'S DISCOVERY OF THE TRACHOMA BACILLUS

FRANCIS I. PROCTOR, A.M., M.D.

BOSTON

WHILE at Kayenta, Utah, in the summer of 1923, outfitting for a trip to the Rainbow Bridge, numerous Navajo Indians came to me for treatment for trachoma, and I became acquainted with the prevalence of this disease among them. The Navajos are a nomadic tribe, herding their sheep over thousands of square miles of wild, desert country, and hence they cannot receive the regular and continued treatment necessary for the cure of trachoma.

Of the 300,000 Indians in the United States, it is estimated that 30,000 have trachoma. The United States Indian Service has attempted to eradicate the disease by an "intensive campaign" but has met with comparatively little success. Recently tarsectomy was heralded as a cure and was performed upon hundreds of children. Many of these were examined last spring, a year or more after the operation, and most of them still had well marked trachoma. There was deformity of the lids in many instances and it was difficult to evert the lids for the after treatment which is required in nearly all of these cases. Most of the men in Europe and this country who have had the widest experience with trachoma are opposed to tarsectomy as a routine procedure, especially in children who can generally be cured by milder methods and without the deformity so often caused by tarsectomy.

Some months of travel through the Indian reservations, with visits to Indian schools and hospitals and conferences with the physicians in the Indian Service confirmed the opinion that it was impossible to eradicate trachoma by the methods then in vogue.

The most efficient way to have combatted the disease would have been to have removed the cause, but the cause of trachoma was unknown. Some had assumed that it was a filterable virus; others attributed it to faulty nutrition.

Effort to find the cause were being made by Prof. Simon of Baltimore and Miss Ida M. Bengston of the United States Public Health Service at Rolla, Missouri. Dr. Polk Richards of Ft. Defiance, Arizona, had scarified the conjunctivae of a number of rabbits and then had injected them with material expressed from trachoma follicles and sent them to Prof. Simon. Dr. W. H. Wilmer examined these rabbits and reported that they had traumatic conjunctivitis but no trachoma. Miss Bengston had worked for two years but without success. The United States Indian Service was not equipped for bacteriological investigation.

Although the search for the cause of

trachoma had baffled European scientists for many years, I knew of Noguchi's successes in other fields and felt that he, with the resources of the Rockefeller Institute for Medical Research at his command, might succeed where others had failed. While discussing the problem with Surgeon General Hugh Cummings, I asked him why he had never invited Noguchi to undertake this work and he replied, "I have been trying for ten years to get him to do it, but he has refused."

The next morning I called on Noguchi at the Rockefeller Institute and stated the case as briefly as possible. He listened attentively and then inquired, "Are you sure that these Indians have real trachoma?" Upon being assured that he could be shown hundreds of genuine cases, he surprised me by saying, without a moment's hesitation, "Then I will go out there and start the work."

He arrived at Albuquerque, New Mexico, early in May, 1926, bringing with him a number of monkeys and a supply of apparatus which quite filled the room at the hospital reserved for his use.

Then followed days of intense activity. He worked from morning until dark, never stopping to rest, frequently going without food, and on one occasion continued working until two o'clock in the morning. And always he was the embodiment of cheerfulness, courtesy, enthusiasm and concentration, an inspiration to all with whom he came in contact.

On one occasion it was suggested that some blind person might be willing to submit to inoculation for experimental purposes. "No," he said, "you must not speak of such a thing. I would not consider it, but," he added, "if I find the germ and do not succeed with the monkeys, I will try it on my own eyes." This attitude of disregard of self and consideration for others was characteristic of the man.

During the following summer he wrote frequently and always referred to his experiments as "encouraging." In May, 1927, a year after his arrival at Albuquerque, he showed the inoculated monkeys and chimpanzees to Dr. DeSchweinitz, Dr. Richards, Dr. Verhoeff, Dr. Derby and myself. All agreed that, judged by the clinical appearance, these animals had trachoma. Then followed an examination of sections from the lids of inoculated monkeys, some showing scar tissue formation. Finally came the thrilling moment when we saw for the first time, mobile and clearly outlined in the dark field of the microscope, the bacilli which had been isolated.

Hideyo Noguchi (1876–1928).

Noguchi had isolated a microorganism from the trachomatous human conjunctiva, had produced a pure culture of this microorganism and with it had inoculated the conjunctivae of monkeys, thereby producing a condition having all the appearance of trachoma in the human conjunctiva, and finally from these inoculated monkeys had recovered the microorganism in pure culture. The requirements of Koch's law had been fulfilled and the cycle was complete.

He reported these results at the New York Academy of Medicine, May 16, 1927, and two days later by special invitation read a paper on the same subject before the Ophthalmological Section of the American Medical Association at its annual meeting in Washington, D. C. His announcement met with a most enthusiastic reception.

Through the summer and early autumn he continued his experiments with inoculations and with blood serum from trachomatous Indians. Full details of these and his other experiments are given in his monograph on trachoma which is about to be published.

Noguchi had long desired to visit Egypt in order to obtain material from trachoma cases there and to compare it with what he had obtained from the American Indians. It is generally assumed that the disease is the same in the two countries but there has been no scientific demonstration of the correctness of this assumption.

He was considering this Egyptian trip in the autumn of 1927 when he was unexpectedly called upon to go to West Africa for work in connection with yellow fever. The work was completed and early in May, 1928, he cabled that he might be able to go to Egypt before returning to New York. A day or two later came the report of his illness and two weeks later the news of his death.

It is difficult to realize how far reaching may be the results of Noguchi's discovery. According to statistics in the possession of the United States Health Service, it is safe to say that of the total population of the world hundreds of thousands, if not millions, have trachoma. In Europe a trachoma league has been formed, and most governments have recognized the importance of the disease and are endeavoring to control it.

But despite the widespread interest in the subject and the great variety of remedies that have been tried, little improvement in the methods of treatment have been made during the last thirty years. Apparently it is necessary to attack the disease from another angle. The results obtained by Noguchi encourage us to believe that progress will be made along the lines upon which he was working and that his discovery is a step, and a most important step, toward the eradication of this scourge which has been causing so much suffering and blindness for hundreds of years.

BOOK REVIEWS

Except for the neurologist and the comparative anatomist, Tilney's THE BRAIN FROM APE TO MAN[1] is in no sense to be considered a medical book nor has it any "practical" value for the physician. It is entirely a *cultural* contribution and not to be looked upon in any other light. Covering as it does one of the most important topics of the day, it is sure for the next year or so to be one of the books most generally discussed. Therefore it behooves a person of culture to be thoroughly acquainted with its contents.

While certain parts of the work are thoroughly scientific and perhaps beyond the ken of the average reader, far the greater proportion of the almost 1200 pages of the two volumes are of general and universal interest to all persons of intelligence.

Presenting a new and novel theory as a basis for discussion of the problem of Evolution or better still, perhaps, the question of man's development and progress through the ages, there are included in these pages a logical and scientifically accurate series of facts, upon which the author bases his theories, which are presented in a rational and logical manner, making his arguments almost impregnable. While the comparative brain sections, of which a great many are presented, may be highly scientific and formidable, any person of intelligence can see at a glance that the sections from the chimpanzee and gorilla more closely approach the human than do any other of the eleven presented and a mere glance will show the almost geometrical progression from the

[1] THE BRAIN FROM APE TO MAN. A Contribution to the Study of the Evolution and Development of the Human Brain. By Frederick Tilney, PH.D., M.D. With Chapters on the Reconstruction of the Gray Matter in the Primate Brain Stem by Henry Alsop Riley, A.M., M.D. Large 8vo, 2 vols. Cloth, pp. 1162, 557 Illus. N. Y., Paul B. Hoeber, Inc., 1928.

lemur to the human, showing that the brain of each "higher ape" possesses some configuration not in the previous one but found in the human until the closest and most complete resemblance is seen in the chimpanzee and the gorilla. These anatomical steps are in each case correlated by the author with additional ability on the part of the animal possessing it, bringing it a step forward from the previous stage until the ultimate known today is shown in the cross-section of man's brain. Extra ability in various directions on the part of man is therefore definitely traced by the author to the configuration of the brain which controls each and every movement or power. Incontrovertible evidence is submitted by the author in verification of all his claims and surely the value of such evidence on hand and available at all times is in itself sufficient reason for the possession of this book by all intelligent persons who want to be posted on this subject.

Modestly presented by the author as the result of ten years ardent and concentrated research, the book has been called by leading scientists the most important contribution to the subject of Evolution since Darwin, and by others is considered as the greatest contribution to culture that has been made in American literature.

It is for these and many other reasons that we bespeak for this valuable work a place in the library of every cultured person.

In the April issue we reviewed the first four volumes of Nelson's Loose Leaf Living Surgery[1] and stated that of them "the editors and publishers might well be proud." The two volumes now in front of us, volumes v and vi, uphold what we said as to the class of contributions, contributors and typography; it is difficult to imagine them being any better.

Volume v, which will cover the peritoneum, gastrointestinal tract, liver, spleen, biliary tract and pancreas, is not in complete form but the articles delivered are complete in themselves, though a little unevenness in value is apparent. However, the contributors represented in this volume are all men of sound judgment, thoroughly familiar with their subjects and express themselves clearly and succinctly.

[1] Nelson's Loose Leaf Living Surgery. Edited by Allen O. Whipple. Seven Volumes and Composite Index. 8vo, cloth, illus. N. Y., Thomas Nelson & Sons, 1927–28.

Volume vi presents a most attractive appearance because of its illustrations, many of which are multi-colored plates. It is devoted to but one subject, urology, but this subject is presented more completely than has been any other subject in the series. The names of the contributors are those of men whom the profession will accept as of the best American authorities. The reviewer has not been able to read the entire volume, skimming through some of the articles and reading extracts from others, but he has read one in its entirety and this for a careful, systematic presentation, which is illuminating and intensely interesting, is one of the best, if not the very best he has ever has the pleasure of reading. This is Dr. Hinman's articles on Renal Structure and Function.

The entire volume is "above par."

It is unfair to the subscribers of any journal to place a volume like Dictionary of American Medical Biography[1] in the hands of an editor for review and this because it comes as such a blessing to an editor that he is apt to ramble on in his enthusiasm beyond the patience of the average reader. From this it must not be assumed that the book is one of interest only to editors. If the writer had his way, a copy of this book would be on the shelves of every American practitioner. In fact, we feel that it should be added to Osler's famous Bedside Library.

Opened at random, any one of the chapters, ranging from a quarter page to three and four pages, could not help but instill in every American physician added respect and enthusiasm for the men who have made American medicine what it is today. This volume is a new work, not merely as stated in the editor's epitaphogia, a third edition. The first publication in two volumes in 1912 was called "An Enclopedia of American Medical Biography." The second, published in 1920, became "American Medical Biography" and now we have a third edition with the errors and omissions of the first two corrected and the subject matter brought up to January, 1927. The writer immediately searched, as all critics do,

[1] Dictionary of American Medical Biography. Lives of Eminent Physicians of the United States and Canada from the Earliest Times. By Howard A. Kelly, M.D. and Walter L. Burrage, A.M., M.D. 8vo, cloth. Pp. 1394. N. Y., D. Appleton Co., 1928.

for omissions and errors and when he experienced unholy delight in the discovery of what he thought were serious omissions, he found in looking into the matter that in every case the men were still living in January, 1927. Sketches to the number of 2049 are included, almost all of them signed by the writers. Perhaps when it is noted that many of the sketches are written by Fielding H. Garrison, Francis R. Packard, Howard A. Kelly, Graham Lusk, Eugene Cordell, George M. Kober, Abraham Jacobi and others of equal standing, sufficient is said.

This encyclopedia is not to be confused with the conventional "Who's Who." The articles are written in delightful narrative style, giving in each case the main details of every man's career and presenting in many cases delightful philosophic evaluation of his work.

No doubt occasional readers will find an omission here and there and in considering this point the editor's standard for "inclusion" should be borne in mind: "What did he do for others; did he advance the science or the art of medicine; did he teach, write, devise apparatus or enter public service?"

Among the many chapters which especially interested the reviewer were: "Francis Delafield" by Walter B. James, "Abraham Jacobi" by Fielding H. Garrison, "John Herr Musser" by Howard A. Kelly, "James Spottiswoode Taylor" by Joseph L. Miller and "John B. Murphy" by William J. Mayo.

Errors were found negligible. Surprise has been experienced at the remarkable completeness of this splendid story of the development of American medicine.

With no intent at carping criticism, but rather with a view to making a good thing better, slight omissions like the neglect to mention that Abraham Jacobi was president of the American Medical Association and a statement that Isaacs Otts' largest work was his "The Action of Medicines," of 168 pages, whereas he published a "Textbook of Physiology" of 563 pages, may be mentioned. Probably every reader will find here and there a little omission in the life of one of his favorites, but no doubt he will be willing to say with the reviewer "What of it?"

Having been familiar with previous editions of Dr. Horsley's Operative Surgery,[1] and having had occasion to say a many good things of it, we welcome this new edition in the light of an old and valued friend in a new dress.

Horsley was among the first to emphasize the necessity of maintaining physiological function and to decry that type of surgery which considers the restoration of the anatomy as being of first importance. This edition shows the author's original ideas to be unchanged. A large amount of new material has been added and changes both slight and marked indicate that careful revision has been done throughout the entire text.

The author's son and present assistant is given credit for much of the revision and new material. His work shows great promise. In fact, the general reader cannot detect the difference between his work and that of his distinguished father.

Here is a translation from the French which is a distinct addition to American medical literature. Compiled by a physician and a surgeon with the aid of a chemist, The Duodenum[1] gives the present knowledge of duodenal anatomy in a manner not hitherto available. By no means to be considered the final word on this harrassing subject, it is probably the best offering of the subject extant. With the excellent roentgenograms, supplemented by anatomical and pathological drawings and accompanied by illustrative case histories, the book is a splendid presentation of the clinical experience and the conclusions drawn therefrom by three authors of unquestioned authority.

No reader will agree with all the conclusions drawn in this volume but neither will any reader put the volume down without a definite feeling of having "learned a great deal."

Again the master of surgery and of English rhetoric presents us with a series of Addresses on Surgical Subjects[2], this time fourteen in number and ranging in subject from the discussion of Hunter to the "Gall-bladder and its Infections." Delightfully written as only Moynihan can write, with the authority behind

[1] Operative Surgery. By J. S. Horsley, M.D., F.A.C.S. Ed. 3. 8vo, cloth. Pp. 894, 756 illus. St. Louis, C. V. Mosby Co., 1928.

[1] The Duodenum: Medical, Radiologic and Surgical Studies. By Pierre Duval, Jean Roux and Henri Beclere. Translated by E. P. Quain, M.D. 8vo, cloth. Pp. 212, 127 illus. St. Louis, C. V. Mosley Co., 1928.

[2] Addresses on Surgical Subjects. By Sir Berkley Moynihan, Bart. 8vo, cloth. Pp. 348, illus. Phila., W. B. Saunders Co., 1928.

every statement that only Moynihan can give, we would that these lectures could be put in the hands of every student and young surgeon.

Two of the addresses alone, "The Murphy Oration" and "The Debt of Pure Science to Medicine," are worth the price of the entire volume, for no one can read them and fail to be inspired. The address on the "Relationship of Radiology and Surgery," delivered before the International Congress of Radiology, should be read and taken to heart by every one at all interested in either of these subjects. None who have entered the medical profession during the past twenty years realize as do the older men in the profession what Roentgen's discovery has meant in the development of the science of Medicine and Surgery. The true history of Roentgenology still remains to be written and should be undertaken during the lifetime of those who were present at its birth. Although these men may not possess that historic perspective considered so necessary in placing the proper value upon the place of individual discussion in the advancement of science, still historians would have their task made easier by having before them a critical history written by the men who lived through the early battles for recognition.

BOOKS RECEIVED

Affections of the Stomach. By Burrill B. Crohn. 8vo. Pp. 910, 357 illus., Phila., W. B. Saunders, 1927.

Allgemeine und Spezielle Chirurgische Operationslehre. By Martin Kirschner, M.D. and Alfred Schubert, M.D. Ed. 1. 8vo, paper. Pp. 656, 709 illus. Berl., Julius Springer, 1927.

L'Anesthésie Epidurale. By Germain Laporte with Preface by Victor Pauchet. 8vo, paper. Pp. 54, 17 illus. Paris, Librairie Octave Doin, Gaston Doin et Cie, Editeurs, 1928.

L'Anesthésie Loco-régionale en Oto-rhino-laryngologie et en Chirugie Cervico-faciale. By Georges Portmann. 8vo, paper. Pp. 326, 84 illus. Paris, Librairie, Octove Doin, Gaston Doin et Cie, Editeurs, 1928.

Annual Report of Surgeon-general of Public Health Service of U. S. 8vo, cloth. Pp. 355. Washington, U. S. Gov't Printing Office, 1927.

L'Architecture Cellulaire Normale de L'Ecorce Cerebrale. By Constantine v. Economo. 8vo, paper. Pp. 183.

Archives of Grady (Municipal) Hospital, White Unit, Atlanta, Georgia. Newdigate M. Owensby, M.D., Editor. 12 mo, paper. Pp. 31. 1927.

Bulletin de la Societé D'Obstetrique et de Gynecologie de Paris. Séance du 14 Mai, 1928. Paris, Masson and Cie, 1928.

Bulletins et Memoires de la Societé des Chirurgiens de Paris. By M. Charles Buigard and M. M. Haller. Vol. xx, No. 9. 8vo, paper. Pp. 55. Paris, Doin and Cie, 1928. With supplement in six languages.

Childbirth. By Wm. George Lee, M.D. 8vo, cloth. Pp. 300. Chicago, Univ. of Chicago Press, 1928.

Chirugie de L'Estomac et du Duodénum. By Henri Hartmann. 8vo, paper. Pp. 346, 142 illus. Paris, Masson and Cie, 1928.

Differentialdiagnose der Chirurgischen Krankheiten des Kopfes, des Halses und der Brust. By F. Honigmann, M.D. 8vo, paper. Pp. 171. Dresden & Leipzig, Theodor Steinkopff, 1928.

Étude Chirurgicale des Gangrènes Juvéniles par Artérites Chroniques non Syphilitiques. By Raymond Leibovici, M.D. 8vo, paper. Pp. 231. Paris, Doin et Cie, 1928.

L'Exploration Radiologique en Gynecologie. By Claude Beclere. 8vo, paper, Pp. 174, 61 illus. Paris, Masson and Cie, 1928.

Folklore of the Teeth. By Leo Kanner. 8vo, cloth. Pp. 330, 17 illus. N. Y., Macmillan, 1928.

The Fundamentals of Human Motivation. By Leonard T. Troland, Ph.D. 8vo, cloth. Pp. 535. N. Y., D. Van Nostrand Co., Inc., 1928.

Gonococcal Urethritis in the Male. By P. S. Pelonze. 8vo, cloth. Pp. 357, 78 illus. Phila., W. B. Saunders, 1928.

Inauguracion del Nuevo Pabellon Para Mujures. Donado por la Liga Argentina de la Lucha Contra el Cancer. 8vo, paper. Pp. 64. Buenos Aires, Imprenta de la Universidad, 1928.

International Medical Annual. A Year Book of Treatment and Practitioner's Index. 46th year. 8vo, cloth. Pp. 590, 86 illus., 53 plates. N. Y., Wm. Wood & Co., 1928.

Konstitutionspathologie in der Orthopadie Erbbiologie des Peripheren Bewegungsapparates. By Berta Aschner, M.D. and Guido Engelmann, M.D. 8vo, paper. Pp. 319, 80 illus. Wien & Berl., Julius Springer, 1928.

Die Körperiegene Freie Fascienverpflanzung Ihre Experimentellen Grundlagen und Ihre Praktische Anwendung. By Ernst Konig, M.D. and M. Kirschner, M.D. 8vo, paper. Pp. 308, 118 illus. and 2 tables. Berlin, Urban & Schwarzenberg, 1928.

Lehrbuch der Physiologischen und Pathologischen Chemie in 75 Vorlesungen. By Otto Furth, M.D. 8vo, paper. Pp. 334. Leipz., Vogel, 1927.

A Manual of Surgical Anatomy. By Charles R. Whittaker. Ed. 4. 12mo, cloth. Pp. 484, 116 illus. N. Y., Wm. Wood & Co., 1928.

Mechanics & Chemistry of the Human Body. By O. Boto Schellberg. 8vo, cloth. Pp. 44. N. Y., Schellberg Institute, 1928.

Medizinische Praxis, Band iv. By Werner Korte, M.D. 8vo, paper. Pp. 194, 26 illus. Dresden, Th. Steinkopff, 1928.

Methods and Problems of Medical Education. 9th Series. 8vo, paper. Pp. 390. Illus. N. Y., The Rockefeller Foundation, 1928.

THIS MONTH'S CONTRIBUTORS

ALLEN, NORMAN M., M.D., F.A.C.S., DETROIT
Associate Attending Surgeon, Harper Hospital.

ASCHNER, PAUL W., M.D., F.A.C.S., NEW YORK
Columbia University; Senior Attending Urologist, Brownsville and East New York Hospitals; Adjunct Surgeon and Assistant Surgical Pathologist, Mt. Sinai Hospital.

BROOKS, CLARK D., M.D., F.A.C.S., DETROIT
Associate Surgeon, Detroit College of Medicine and Surgery, and Harper Hospital; Consulting Surgeon, Woman's and Receiving Hospitals.

BUTTERFIELD, P. M., M.D., F.A.C.S., NEW YORK
Instructor in Urology, Cornell Medical School; Assistant Visiting Urologist, New York Hospital; Chief, Children's Urological Clinic, New York; Attending Urologist, Sydenham Hospital.

CADENAT, F. M., M.D., PARIS
Associate Professor, Faculty of Medicine, Paris; Surgeon, Hospital of Saint-Louis.

DALLDORF, GILBERT, M.D., NEW YORK
Department of Pathology, New York Hospital.

DECOURCY, JOSEPH L., M.D., CINCINNATI
Attending Surgeon, Good Samaritan Hospital.

EISBERG, H. B., M.D., F.A.C.S., NEW YORK
Lecturer on Experimental Surgery, and Assistant in charge of Department of Experimental Surgery, New York University and Bellevue Hospital Medical College; Attending Surgeon, Riverside Hospital; Assistant Attending Surgeon, Harlem and Broad Street Hospitals.

GALLANT, A. E., A.B., M.D., LOS ANGELES
Professor of Orthopedic Surgery, College of Medical Evangelists, Clinical Division; Senior Attending Surgeon, Orthopedic Service, Los Angeles General Hospital; Member of Staffs of Los Angeles General, Hollywood, California Lutheran, White Memorial and Queen of Angels Hospitals; Orthopedic Surgeon, Orange Co. Hospital, Santa Ana.

GUTIERREZ, ROBERT, A.B., M.D., NEW YORK
Chief of Clinic, Urological Department (James Buchanan Brady Foundation) of the New York Hospital; Attending Urologist, New York Hospital and Ruptured and Crippled Hospital.

HARTMAN, HOWARD R., M.D., F.A.C.P., ROCHESTER, MINN.
Associate in Section in Division of Medicine, Mayo Clinic; Assistant Professor of Medicine, Mayo Foundation for Medical Education and Research, Graduate School, University of Minnesota.

HIRSCH, EDWIN W., M.D., CHICAGO
Department of Urology, College of Medicine, University of Illinois.

HYMAN, ABRAHAM, M.D., F.A.C.S., NEW YORK
Associate Surgeon, Mt. Sinai and Lebanon Hospitals; Attending Urologist, Israel-Zion and Riverside Hospitals; Consulting Urologist, Montefiori Hospital.

KELLER, WILLIAM L., M.D., WASHINGTON
Professor of Surgery, Army Medical School; Chief of Surgical Service, Walter Reed Hospital.

PROCTOR, FRANCIS I., M.D., BOSTON
Member of Advisory Committee on Trachoma, American Medical Association.

RIVERS, ANDREW B., M.D., ROCHESTER, MINN.
Associate in Section in Division of Medicine, Mayo Clinic; Instructor of Medicine, Mayo Foundation for Medical Education and Research, Graduate School, University of Minnesota.

RUSSELL, THOMAS H., M.D., F.A.C.S., NEW YORK
Associate Professor of Surgery, New York Post-Graduate Medical School and Hospital; Visiting Surgeon, Gouverneur Hospital; Consulting Surgeon, St. Joseph's Hospital, Far Rockaway.

SECOR, WILLIAM LEE, M.D., F.A.C.S., KERRVILLE-ON-THE-GUADALUPE, TEXAS
Chief of Staff, The Kerrville Clinic and Secor Hospital.

SHEEHAN, J. EASTMAN, M.D., F.A.C.S., NEW YORK
Professor of Plastic Surgery, New York Post-Graduate Medical School and Hospital; Associate Director, International Clinic for Otorhinolaryngology and Facio-Maxillary Surgery, Paris.